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entral Pyrenees

F. SPENCER CHAPMAN

Lives of the Seals

by R. M. LOCKLEY

Hokkaido—Hannibal in the Alps—St Petersburg

Gyr falcon eyas from "The Gyr Falcon Adventure," by Stanley Cerely.
(Collins, 18/-.)

Rara Avis

One of the special haunts of the swift-winged gyr falcon lies in the fjords of north-west Iceland. To photograph this fierce and rare bird in such difficult terrain is a task which not only demands extraordinary patience, endurance and skill but is one which calls for a film of the finest performance and quality. Small wonder that Stanley Cerely relied exclusively on Ilford HP3 for all the pictures that appear in his recently published book, "The Gyr Falcon Adventure".

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St Petersburg

by MARIE NOËLE KELLY

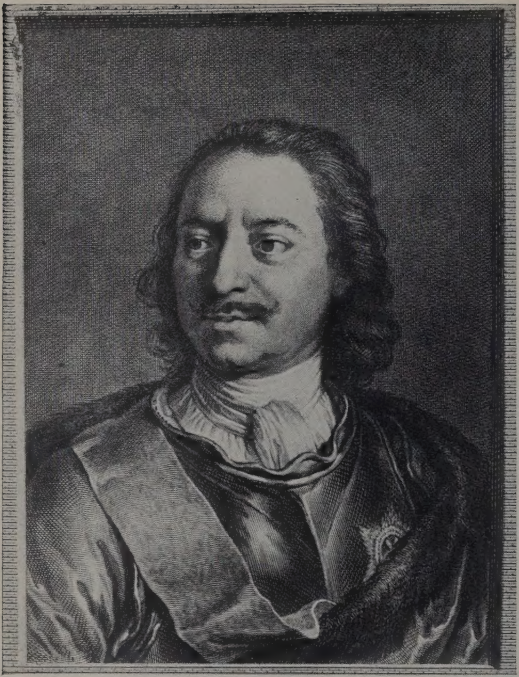
Leningrad during and since the Russian Revolution has had a story of its own. This is the story of historic St Petersburg, of its building, and of its strangely extrinsic place in the Russian scene, as it impressed itself on the author during the years that she spent in the Soviet Union. Lady Kelly is the wife of Sir David Kelly, British Ambassador to Russia from 1949 to 1951, and is the author of Turkish Delights, Mirror to Russia *and* Picture Book of Russia (*Country Life*)

MILLIONS have gaped in the Red Porphyry shrine in Moscow at the enigmatic rosy-faced mask of Lenin, but no-one is allowed to pause and try to decipher the infinitely remote and somehow sad look on the tightly drawn features of the dead ruler, for soldiers move one on in a steady stream. Perhaps now that Stalin lies there too, the student of physiognomy will be allowed more than a fleeting glance.

Few, however, now study the unguarded death-mask of Peter the Great, which lies below a thin sheet of glass, in a corner of a room in his little summer 'palace' in Leningrad. It is a rough and greyish cast, but extraordinarily moving in its simplicity, with a restful expression, the hair brushed back, the forehead immensely wide, the nostrils a little dilated, the mouth generous and imperious with a slightly sardonic curl, even in death. Was he counting—and did death catch him thus—the scalps hung round the piles sunk in the Baltic swamp? Hardly, for they numbered many thousands; more likely he was thinking out one more of those gross 'farces' he loved to perpetrate on a favourite or a courtier. Nothing matters of course now, and the differences in expression in the death-masks of the Autocrats are only interesting when one thinks of the contrast between the fragility of the masks and the genius that once informed the dead men's brows. . .

All about Peter was immense: his stature, clothes, topboots, trophies, canes, weapons, all were those of a giant. His marine instruments, saws, carpenter's tools, beautifully kept in the Winter Palace, are on Brobdingnagian scale. Only one thing did he like small: his houses, his little houses, of which I know three; one in the shadow of the fortress of SS. Peter and Paul, made of rough black timber, very similar to the second which you may find near Moscow at Kolomenskoy—each of them inevitably suggestive of a toy Noah's Ark—and his little brick house in the Summer Garden in Leningrad in which this mask is shown. It is just big enough to be a gentleman's dwelling. Perhaps I should add a fourth, "Mon Plaisir", a pavilion at Peterhof on the edge of the Baltic, no larger than a 'folly' of the period, from which he could see his beloved Kronstadt. Somehow for a man titanically planning a city like St Petersburg, these little homes were an expression of humility, of some feeling that his own immediate setting was transitory, without significance; all that mattered was the future dream-city. And let us not forget here that Peter, unlike the later Tsars, was a true Russian, and the true Russian, even today, feels in his bones that here he "has no abiding city"; it is the old instinct of the forest or steppe nomad for 'moving on'. For Peter was not interested in his own temporary homes; any expenditure on them would only be a diversion of effort from the Great Plan; the plan for St Petersburg, though it cost hecatombs of lives, was no tyrant's caprice, but a step forward in a movement of expansion which corresponds with a deeply significant trend of the Russian imagination. At what stage had this movement arrived when Peter set up as 'clerk of the works' in his wooden hut?

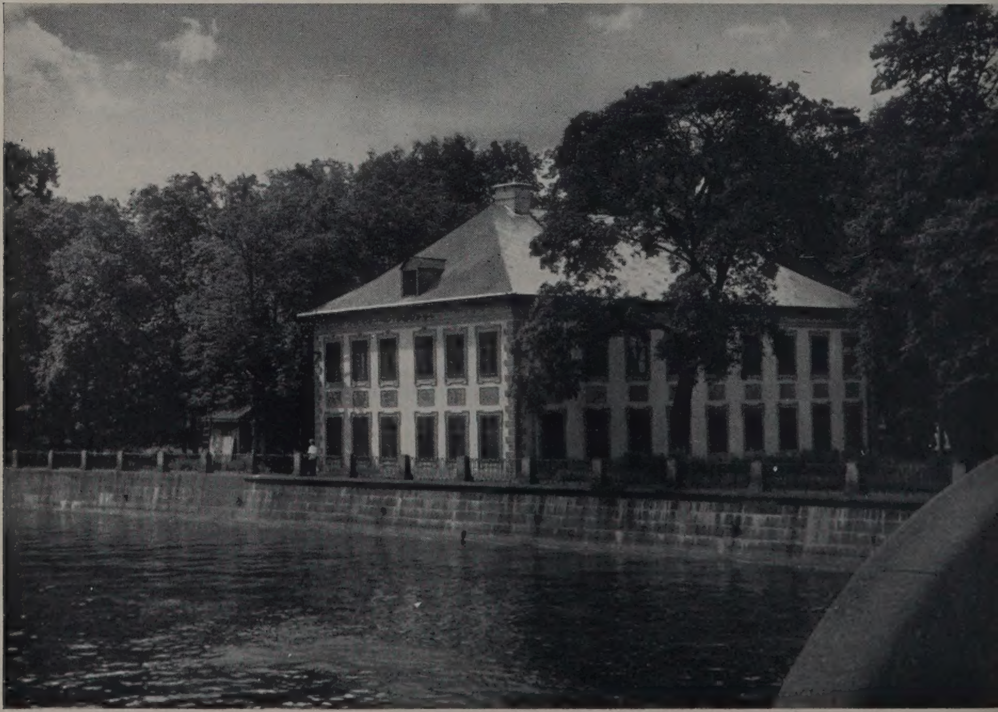
The Tartar occupation had destroyed the independent life of the old Russian cities, Pskov, Novgorod, Kiev and the rest, leaving Moscow supreme. The expansionist movement started in our first Queen Elizabeth's time by Ivan the Terrible has never ceased. There have been many setbacks, but always the end of each century shows a substantial increase over its beginning. Now south-eastwards to finish off the Tartars, or eastwards to colonize Siberia; then north-west to secure the gateway on the Baltic and southwards to secure the northern shores of the Black Sea; west of the Caspian into the Caucasus, east of the Caspian into Central Asia. Each forward movement of a tentacle gropes along what at any given moment was the line of least resistance; so Peter the Great's forward move from the centre to the Baltic periphery fitted in with his failure, as recorded in Miss Scott Thomson's article in the September number of *The Geographical Magazine*, to push through to the Black Sea; with the state



(Left) *Peter the Great in 1716, at the age*
forty-four: from a portrait done by his offici
painter, Louis Caravaque, at Astrakhan on the low
er Volga during one of the Tsar's many journey
This is the giant of a man, "the mouth genero
and imperious, with a slightly sardonic curl",
whom it has been said that "his capital, for t
time, was the place where his headquarters stood"
(Below) *Peter's small 'palace' in the Summ*
Garden at St Petersburg (Leningrad), built by t
Italian architect Domenico Trezzini in 1710-13
the junction of the River Neva and the Fontank
a subsidiary arm. Trezzini came to Russia in 170
from Denmark; the German-Dutch style then dom
inant there pervades the earlier buildings of the ci

British Museum

By courtesy of the Society for Cultural Relations with the U.S.S



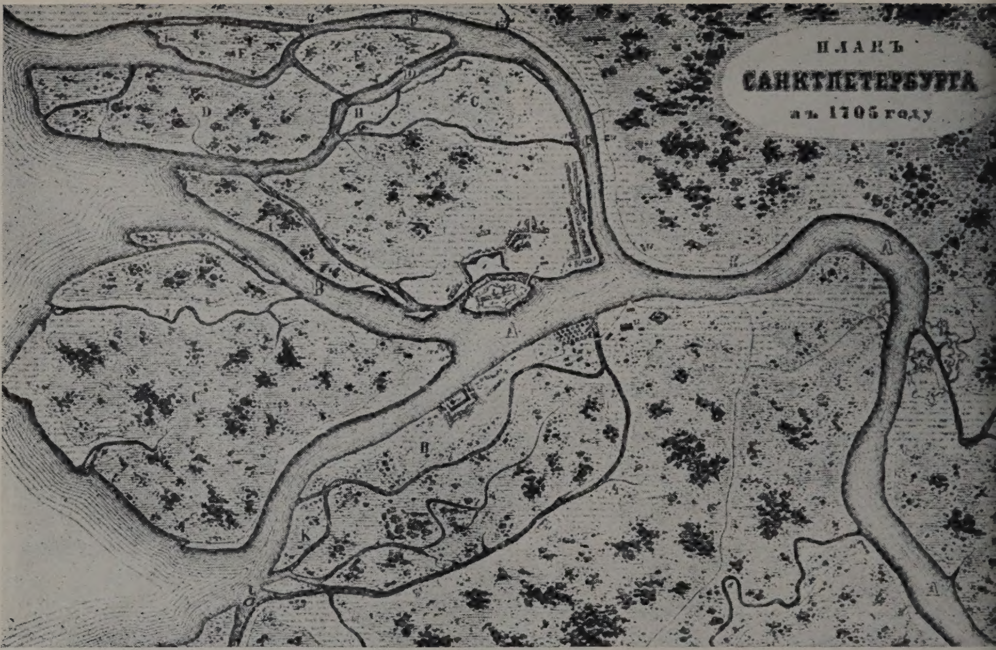
of feudal anarchy into which Poland had fallen; and above all with the outreaching by Sweden of its own resources, which brought the impetuous Charles XII to defeat at Poltava and Hangö.

True, Peter the Great already had the Arctic seaboard; but the superior advantages of a Baltic port were many and obvious. Archangel was ice-bound for about seven months of the year, the Neva for only five; the voyage from Archangel to the West was long and dangerous, egress through the Baltic was short and easy. By land too, Archangel was remote and isolated: when the Earl of Carlisle came on a special mission from Charles II, his journey to Moscow took several months; so there could be no question of trying to transfer the whole seat of government to such a remote inhospitable spot. The flat banks of the Neva on the other hand linked up with the old chain of mediaeval Russian cities; a secure line of communication to Moscow presented relatively little difficulty. In fact Peter virtually moved the city of Novgorod to the mouth of the Neva, after having built a temporary capital at Azov which he abandoned in 1711. Had it not been for the invention of railways which revalued all distances his capital might have forever displaced Moscow, and his revolution—the revolution of a sovereign against his people in contrast to the conventional idea of a revolution—might have come to stay.

By courtesy of Soviet News

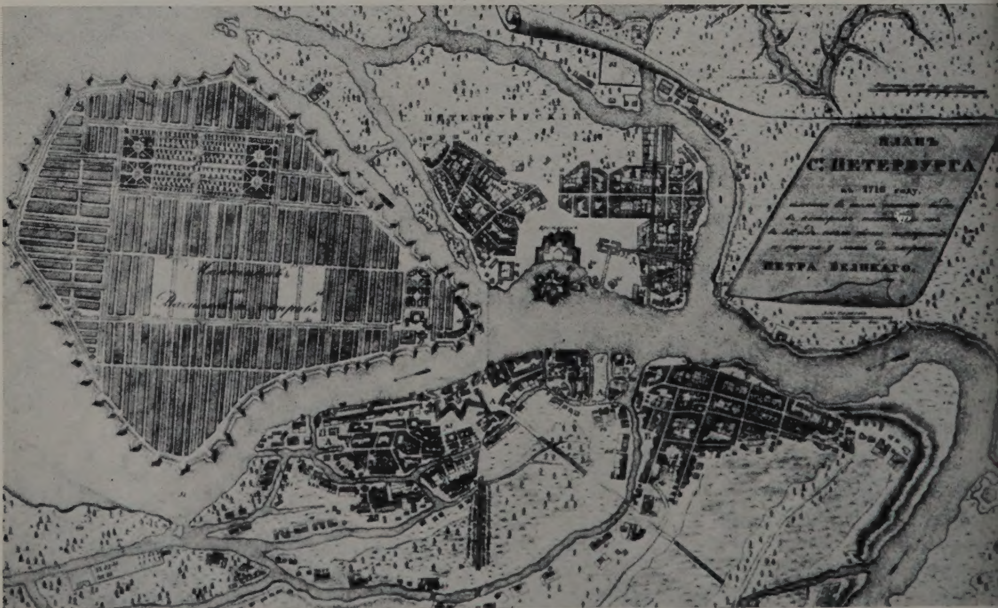
Pushkin's "Bronze Horseman": the statue of Peter executed by the French-Swiss sculptor Etienne Falconet to the order of Catherine II and unveiled in 1782. On its base is the proud motto: Petro Primo Catharina Secunda

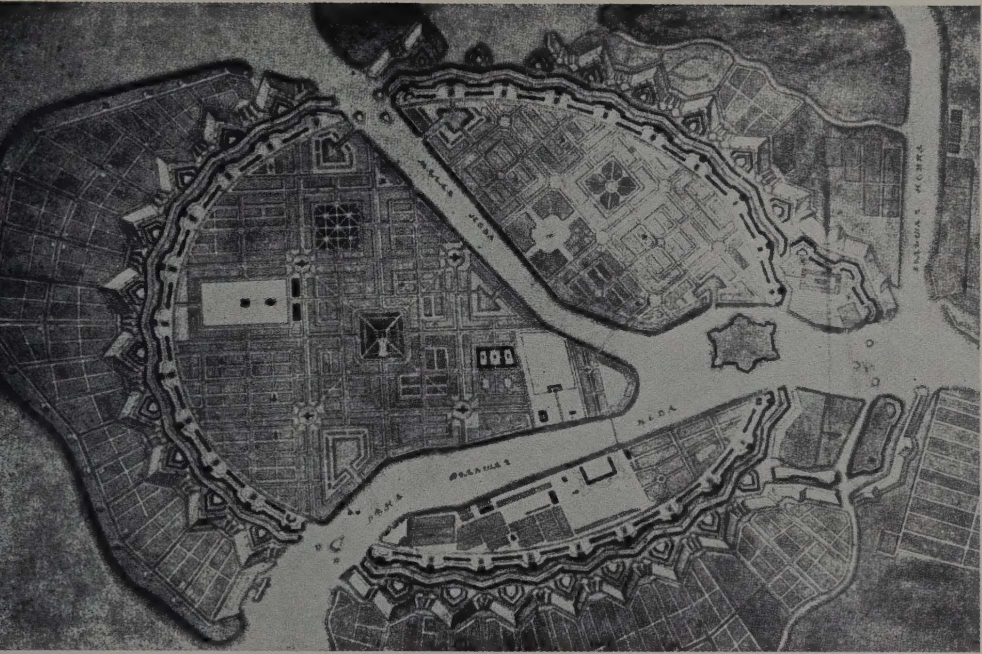
It is interesting to study the old plans and to note how Peter made an initial mistake in planting his tents on the "willow" island on which stand the fortress of SS. Peter and Paul and the church of the Trinity, and stood the Senate and the bazaar or Gostiny Dvor. He changed his mind twice, first when he moved the administrative 'Colleges' and the bazaar to the island Vassili Ostrov in 1715; and again in 1717 when Leblond the French architect elaborated a plan envisaging an oval-shaped town bounded by a double belt of fortifications, which should cover the three islands, all to be geometrically intersected by a network of canals. This was a dream which would have cost even more immense sums than the real St Petersburg did, and it did not reckon with the tempestuous Neva which controls and directs all the city's life: in the winter like an ermine collar round the city's neck, in the summer a highway of liquid silver. How could St Petersburg develop if marooned on the three islands, cut off both when the wide river flings the ice-floes noisily together in the spring, and when it is freezing up in the autumn for the long winter? So finally the Tsar moves his insular



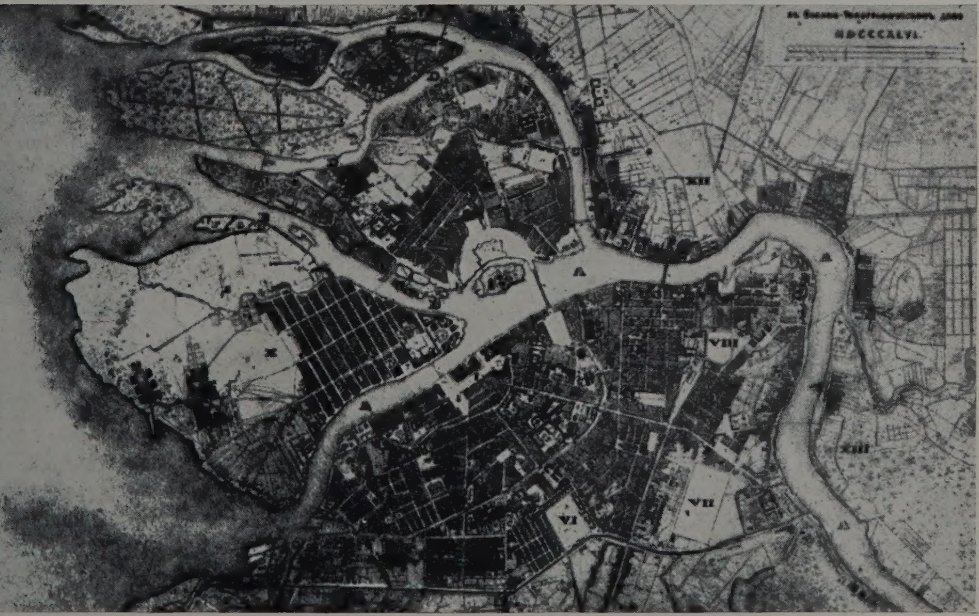
All four plans reproduced by courtesy of the School of Slavonic and East European Studies, University of London

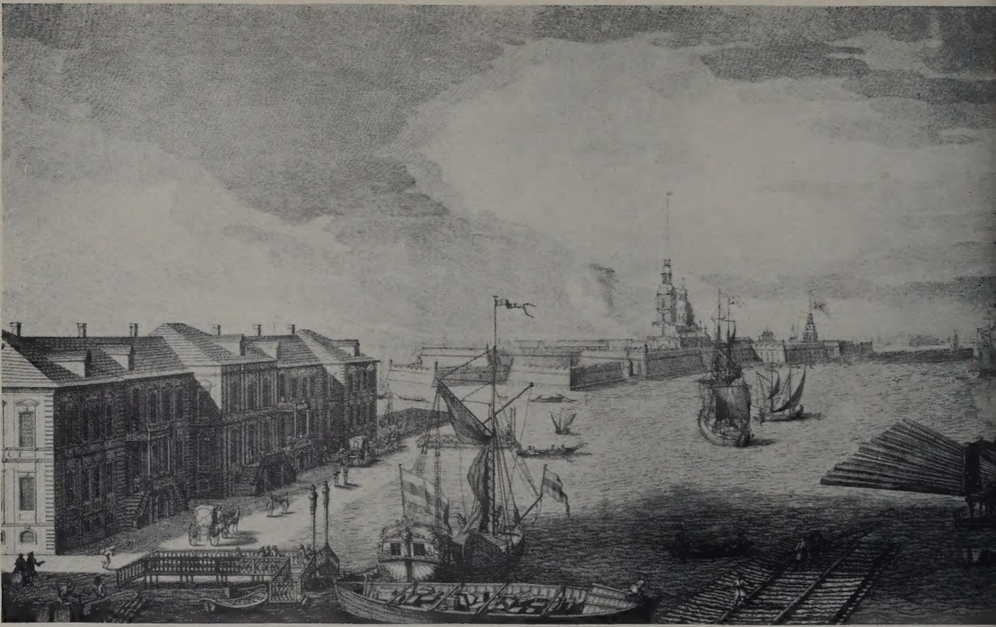
(Above) *St Petersburg in 1705, showing on the north bank of the Neva only the Peter and Paul Fortress, where the first stone was laid in 1703, and the newly-established Admiralty on the south bank.* (Below) *A plan of 1716, drawn up by Trezzini but not executed, for development on Vassili Island*





(Above) *The unrealized scheme of the French architect Alexandre Leblond, who from 1716 to 1719 (when he died) had charge of the planning. With Vassili Island as its centre, the city would have been cut off for much of the year and, as seen* (below) *in a plan of 1840, it eventually grew on the mainland*





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(Above *and* opposite) *An 18th-century view of central St Petersburg looking eastwards up the Neva. On the left is the Academy of Sciences on Vassili Island with the Fortress of SS. Peter and Paul beyond; on the right is the Winter Palace.* (Below) *The quarter-mile river-front of the Admiralty*

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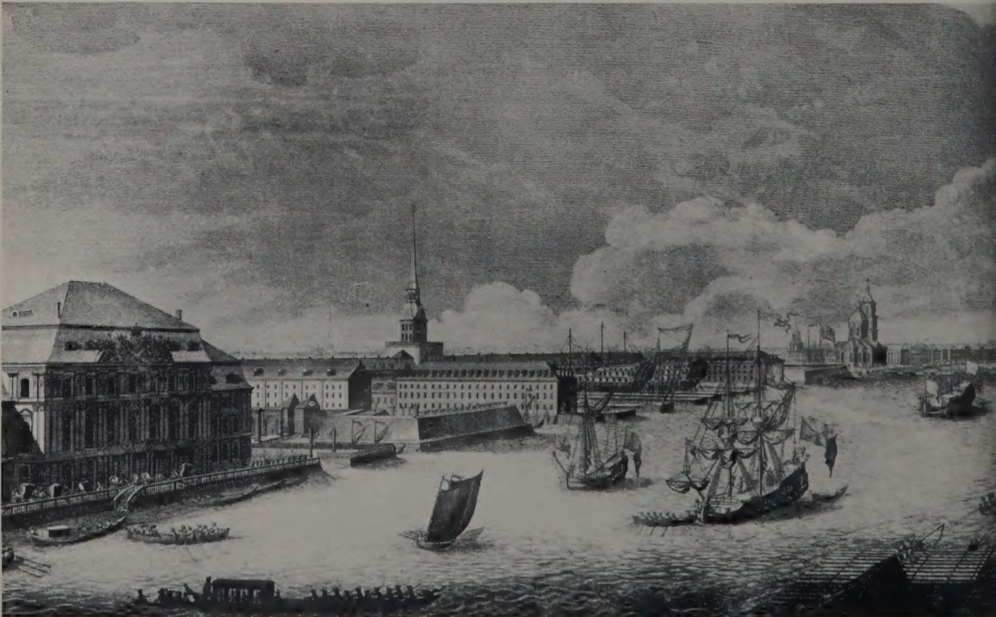

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(Below) *The so-called "Twelve Colleges" on Vassili Island, begun by Trezzini in 1722 and completed in 1732. One of Peter the Great's major reforms was to entrust state administration to ministerial 'colleges' on the Swedish model; these buildings were designed to house the departments under them*

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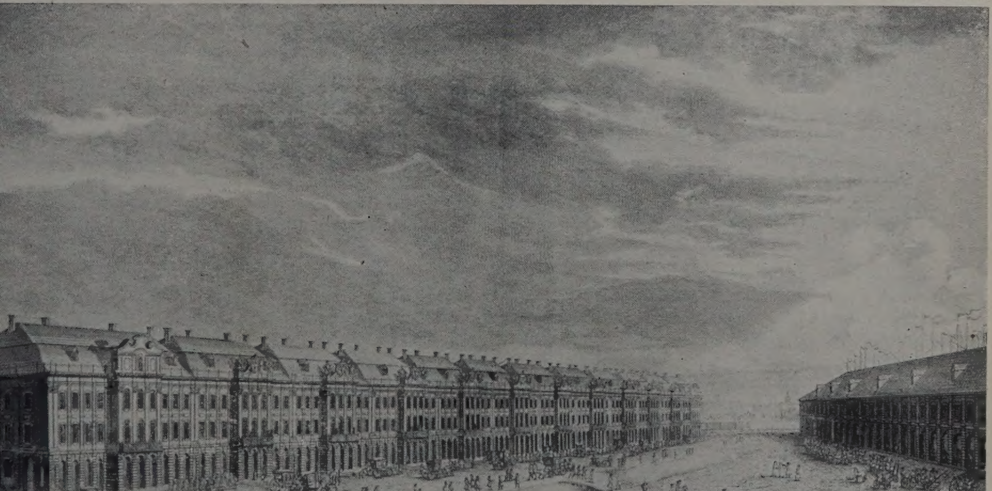

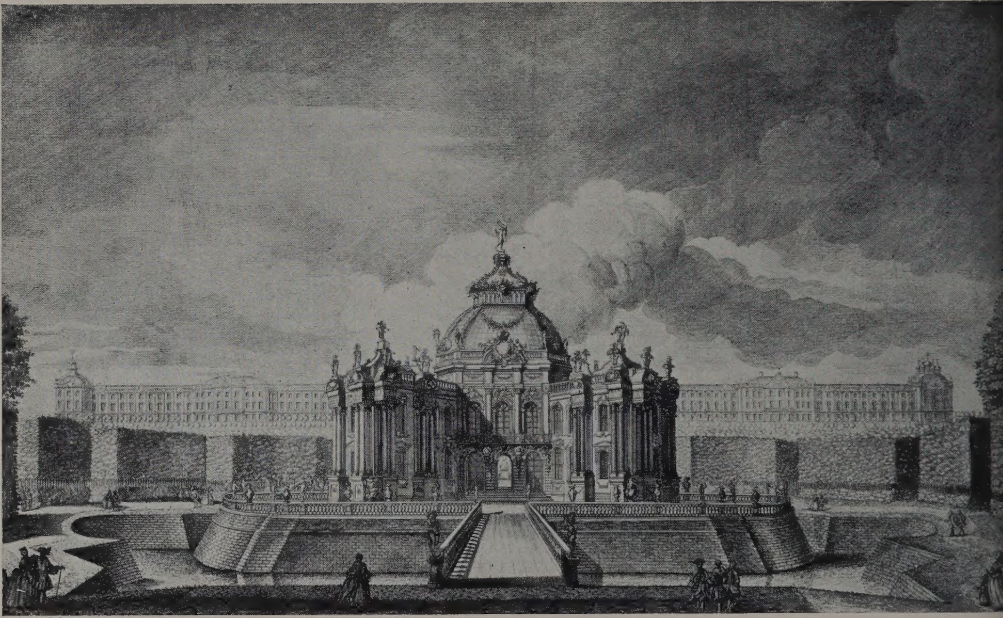

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At Tsarskoye Selo, behind the pavilion known as the Hermitage, built by Rastrelli in 1746-52, stretches the 1000-foot front of the Great Palace, which he also designed and completed in 1756

city and plants it on the mainland where it grows and flourishes until he dies.

The mushroom city languished awhile when Peter II moved the capital back to Moscow, all the Court vastly relieved, as they had been ordered to build their own houses at any cost. But already in 1732 the Empress Anne is back North again, artisans and courtiers trailing back with her at the crack of the whip. Like an orchestration swelling to its climax through the reigns of Elizabeth and Catherine, the beautification and glorification converge in a pagan shrine for the great Catherine, herself "*prosternée devant la posterité*", as Diderot said to Grimm. The governing class, now orientated to Europe politically, adopts *en bloc* all the polished arts of the Age of Enlightenment—the Europe of Louis XV. The Empress Elizabeth, though a bestial character in many ways, rightly believed that the study of the Classics could regenerate the Arts, though on the more doubtful ground that close imitation of the Romans would regenerate mankind.

Pushkin, the only Russian genius who with an imperious pride assimilated to the Russian soul Peter the Great's mission, embodied the classical artificiality of Petersburg into a golden poetry and prose which "Soviet patriotism" has had the sense to exploit. The great ballet *The Bronze Horseman*—dramatizing alike the Neva, the city's impotence before its unleashed icy floods and the haughty statue by Falconet which was the subject of Pushkin's epic—proves to us in the 20th century, as its theme did to the French traveller Custine in the early 19th, that St Petersburg, although Russian in its disregard of physical impossibilities, in its military character as a headquarters for a Court and hierarchy, was founded contrary to Nature. It might be Russian, yet, as Nicholas I said, it was not Russia. As every 19th-century Slavophile felt (for none of them had Pushkin's extraordinary sense of symmetry, balance and combined sense of the romantic-classical) the creations by French or Italian architects were only 'natural' to Russia in their scale, their malachite magnificence. Custine shrewdly summed it up as a Greek city improvised for the Tartars as a theatrical set, the power and splendour of which only Pushkin has truly and beautifully synthesized in literature. Peter as founder-manager of it was not deceived by the glamour of Western palaces as were his successors, who disregarded

Moscow. He sought Western technique as a means, not (as did the 19th-century Tsars) Western culture as an end.

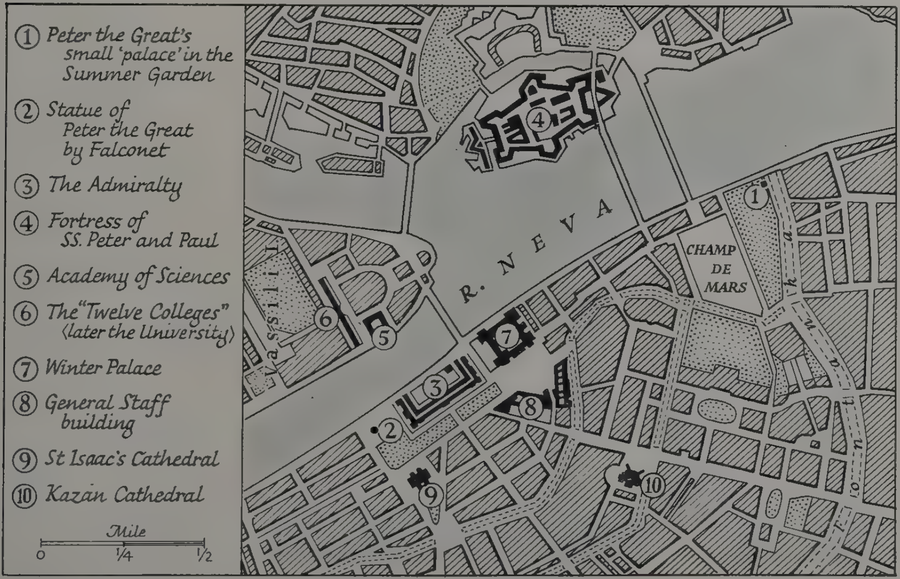
Intensely secular, Petersburg's spires are few, its cupolas almost non-existent; its churches are great piles of marble and granite, more suitable for Berlin. St Isaac and the Kazan Cathedral are there to glorify the autocrat of all the Russias, to form the setting for the propaganda of a secular ruler dispensing religious opium for his suffering people.

Every 19th-century visitor to the Court city has felt its pulse stop when the Emperor was away, even if only at Peterhof or Tsarskoye Selo. The only spirit that can resurrect the capital today from its decomposition, that makes one forget flaking stucco and sickly yellow plaster peeling off every palace, is that of military splendour: the Soviet Army parading in the great Admiralty Square or in the Champ de Mars, the Soviet Fleet in the Neva. Then the vast period-piece renews its purpose, its glorious monuments become again the frame within which is displayed Russia's race with the West—the tortoise and the neurotic self-mutilating hare!

In this race, Peter the Great's influence architecturally seems small; a great plan, delightful Dutch canals, the fortresses of SS. Peter and Paul and nearby Kronstadt. Characteristically all is copied, no new style is evolved. Its orderly tentacles reach out over the flat distances, its unity is assured even against the consequences of the Soviet Revolution, and the functional simplicity of Peter's Dutch house in the Summer Garden was overtaken by the maturer baroque sympathies of Leblond, Trezzini and the great Rastrelli. Peterhof, with its terraced cascades flowing down to the Baltic, proved that the military defence of the district was no longer so important as its administrative and cultural development, as a home for his lieutenants, the aristocracy. The Stroganovs, Vorontsovs, Yussupovs, Sheremetievs built their palaces along the canals in brick and stucco, but the foreign architects, with daring decorative innovation, used vivacious sea-greens, orange or turquoise blues, for polychromatic façades that created a fairy-tale city amidst the snows and leaden skies.

The fabulous Palmyra of the North was justifying its title, with its distinct colonnaded perspectives so well painted by Venetsianov, its complicated bronzed pillars, its blue-and-white-turbaned Smolny convent. French fantasy, Italian exuberance, *carte blanche* for his expenses: such were the stimulants to encourage Rastrelli when he designed the great palace at Tsarskoye Selo.

Faithful to every mood in France and the West, to the classical reaction disseminated by the newly founded Academy of Fine Arts, the new architects, Vallin de la Mothe and the


① Peter the Great's small 'palace' in the Summer Garden
② Statue of Peter the Great by Falconet
③ The Admiralty
④ Fortress of SS. Peter and Paul
⑤ Academy of Sciences
⑥ The "Twelve Colleges" (later the University)
⑦ Winter Palace
⑧ General Staff building
⑨ St Isaac's Cathedral
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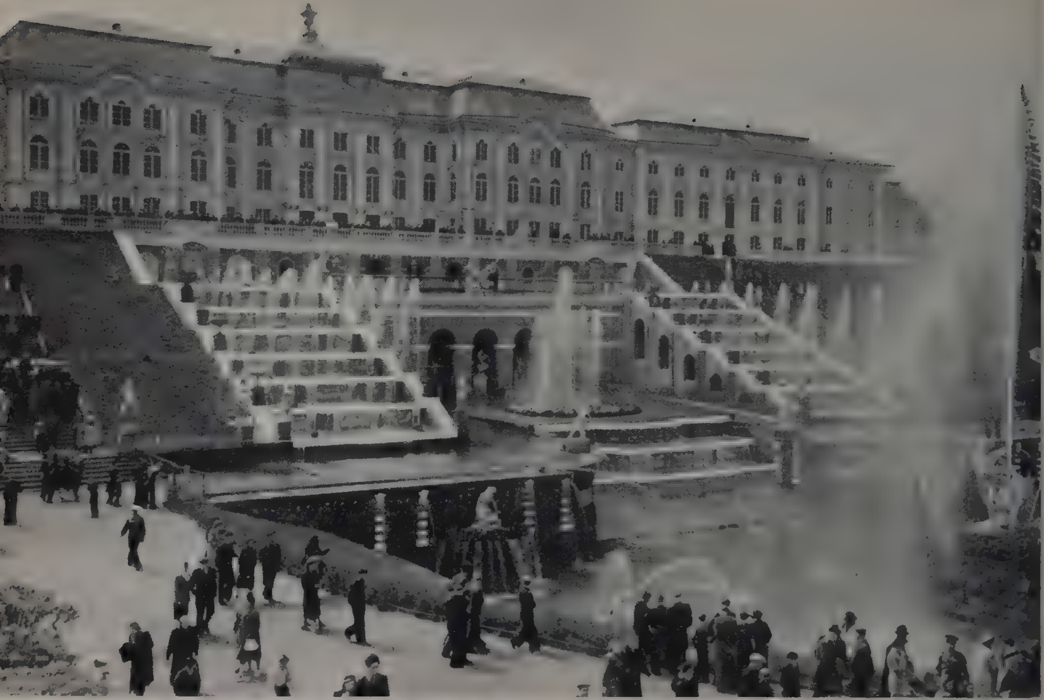
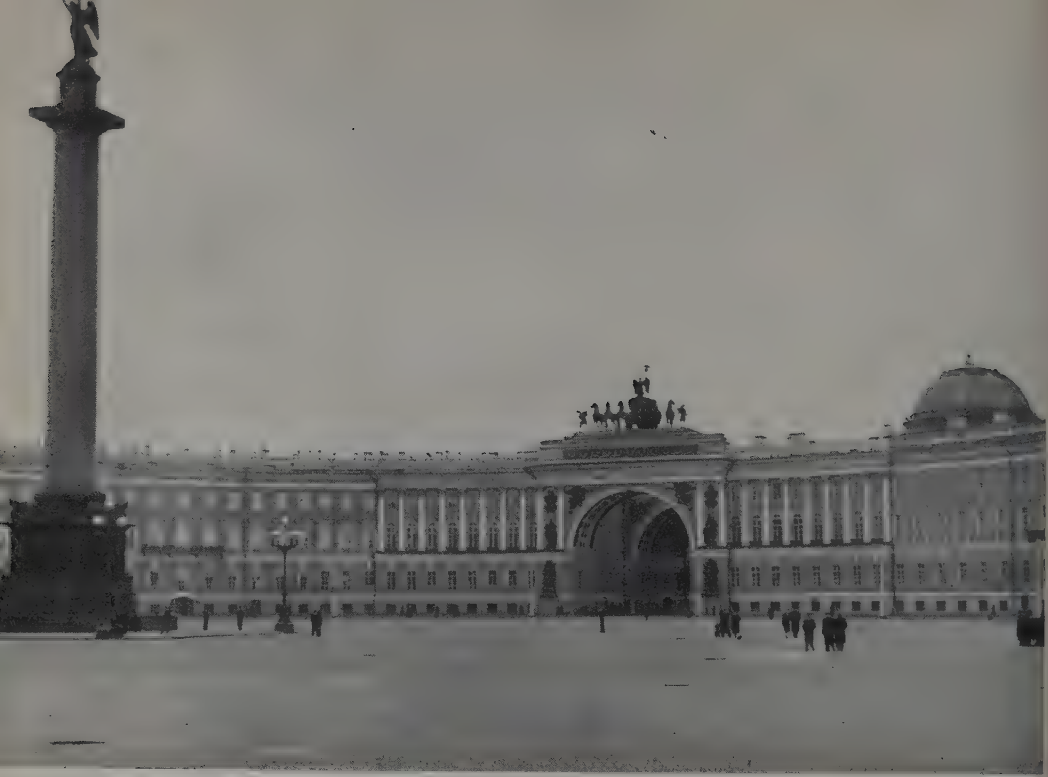


By courtesy of Soviet News

(Above *and* left) *At Peterhof (Petrodvorets), overlooking the Baltic, the palaces and fountains were wrecked by the Germans advancing upon the suburbs of Leningrad during World War II; but they have now been to a great extent restored. The main palace, designed by Leblond for Peter the Great as a "seaside Versailles", was completed in 1720 and rebuilt under Catherine II.* (Opposite) *Many of the buildings of 18th-century St Petersburg still embellish Leningrad in the present century:* e.g. (above) *the Winter Palace, which, though reconstructed in the 1830s, has most of the features that it was finally given by Rastrelli in 1754-64; and* (below) *the Admiralty with its two-hundred-foot gilded spire, erected in 1734-5 by command of the Empress Anne*

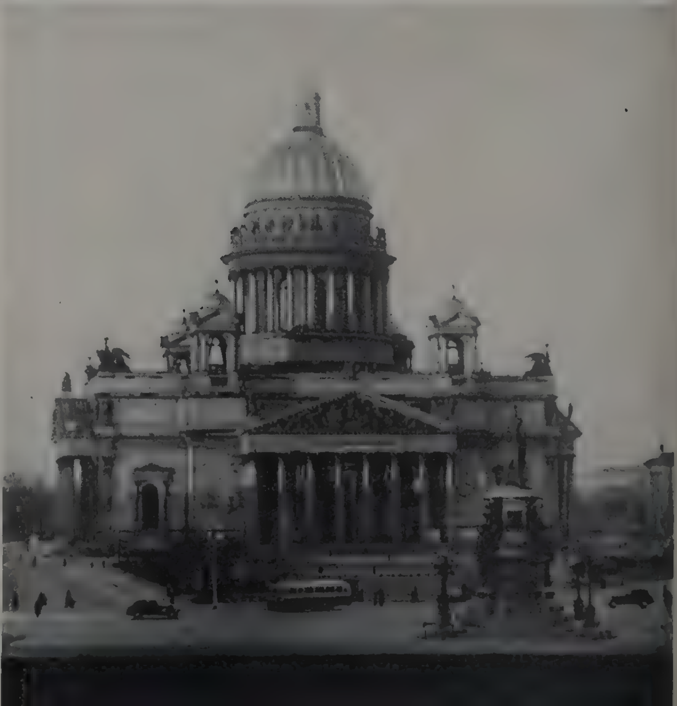
By courtesy of the Society for Cultural Relations with the U.S.S.R.

Both photographs by courtesy of Soviet



photographs by courtesy of Soviet News

The 19th-century Tsars continued the grand tradition of their predecessors in their architectural additions to St Petersburg; but these were inspired quite as much by foreign models as those of the 18th century and blended far less effectively with the Russian scene. (Right) *St Isaac's Cathedral and* (above) *the General Staff building, facing the Winter Palace to the south-east, both date from the first half of the 19th century and would be better suited to Berlin: they are there "to glorify the autocrat of all the Russias" and the development which they fulfil seems alien, imposed from above*



famous Scotsman Cameron, were joined by Rinaldi and Quarenghi in the creation of numerous public buildings and palaces whose handsome proportions and influence became the ambition of every country-town bureaucrat in Russia; and the Soviet Government has returned to classical simplicity, so well did it blend with a low-lying horizon and skies, which, unlike the stage-setting of which one is so conscious in many Italian landscapes, are as unending here as the flight of the gulls . . .

This problem of St Petersburg's place in Russian life brings up the whole question of the Russian soul and the historical background of the aspirations which found their literary expression in Slavophilism. When I spoke of the alien un-Russian character of St Petersburg to an inquisitive geographer he asked me how I distinguished the classical creation of the Romanovs from the English adaptations of Italian architecture and design. It is a very pertinent enquiry. Inigo Jones' Renaissance Watergate and Queen's House at Greenwich, Wren's churches, the stately homes built in Lord Burlington's Palladian, have become, and always were, an essential part of the English landscape; an appeal for St Paul's Cathedral quickly brings in vast sums, even the Treasury makes special arrangements to save the great Italianate country houses. Yet all these foreign styles were adopted with enthusiasm during the very periods in which the national life and institutions were getting further and further away from Mediterranean, and indeed European, influences.

There was no parallel development in Russia, because the Emperors and Empresses, and their courtiers, who called in Rastrelli or Cameron, in no way correspond to the Stuart Kings or the great Whig nobility. Peter the Great himself, if a revolutionary, was a true *Russian* revolutionary—he wanted Western technique, a Western army and navy; but he is said to have observed that "Europe is necessary to us for some decades", and he conscripted the nobility to serve the state and in return consolidated the serfdom of the peasantry. His work however in St Petersburg was to lay the foundations: the little which survives from his time is Dutch rather than French or Italian. The successors who built the city as we know it, Catherine and Alexander I and Nicholas I, were halt Western by blood and education. They had little in common with the real Russians except their belief in autocracy and their disregard for the rights of the individual. When the Winter Palace was rebuilt in the 1830s the artificial heating, to accelerate the construction, caused the deaths of hundreds of workmen when they went out into the Russian winter: a pocket edition of Peter the Great's using-up of many thousands in his pioneer work. These autocrats imposed from above an alien tradition which had nothing in common with Russian feeling, history or landscape. The popular Russian feeling was fundamentally opposed to that of Western Europe, to all the Western tradition of form and balance and all its values inherited from Greece and Rome, the Middle Ages and the Renaissance; and during the 19th century the protest became articulate. Dostoievski said St Petersburg was the most abstract and artificial city in the world; Aksakov said the first condition of emancipation for the Russian soul was that it should hate St Petersburg with all its might. Chadaev said the Russians were the natural heirs of the Old East; Danilevski that Russia by becoming European fell into a trap. In the writings of Herzen and Tiuchev and Gorki, even in Turgeniev, runs the same feeling: that the Westernization has been a great mistake; that the Russians have no use for Western logic and restraint; that they are, in Dostoievski's words, "the only God-bearing people, the only people called to renew the world and to save it in the name of a new God."

The formal architecture and town-planning of Petersburg was as antagonistic to all this vague Messianic mysticism as it was to the spirit of the interminable plain with its wooden houses and its Byzantine churches in which the Byzantine culture was subtly modified by still more Asiatic influences. The architecture of the Tsars and their courtiers was rightly felt to be far more than a form of art; it was linked with the French prose of the Enlightenment and the Encyclopaedists, the German bureaucracy and estate managers, the Italian opera and the French theatre with its Roman or Greek costumes and rigid forms. The new rulers of Soviet Russia, sharing Peter the Great's passion for Western technique, but basing their doctrine on German materialism, reject Dostoievski's mystic Slavism, have taken over the classical ballet, and have experimented in neo-classical architectural forms; but their heart is in Moscow and the great industrial plans for the Urals and Asia, leaving St Petersburg on one side as a vast period museum, the petrifaction of a whole, finished historical epoch.

Climbing in the Central Pyrenees

by F. SPENCER CHAPMAN, D.S.O.

Through his books and broadcasts many aspects of the author's adventurous life are known to a wide public; his record as a mountain-climber has attracted less attention though at least one of his books, Memoirs of a Mountaineer, *is devoted to this activity. Here he describes a holiday in a mountain region which, while within easy reach, is seldom visited by British climbers*

Last year, instead of our usual caravanning holiday, we took a small house on the Mediterranean coast of Spain for the school summer holidays; but the prospect of staying six weeks in the same place—even on the Mediterranean—did not appeal to me, so I decided to spend a fortnight climbing in the Pyrenees before joining the family in the middle of August.

I had crossed the Pyrenees a dozen times on my way to and from Spain, but as the direct routes take one over low passes at either end of the range, I had never visited the Central Pyrenees except for a few days spent in Andorra on my first attempt to visit Spain. On that occasion I had been turned back at the frontier because I had not realized that a visa was necessary to enter Spanish territory.

Now the problem was to find someone to come with me, since most of my friends had already arranged to go to the Alps; however, at the last minute an old climbing friend rang up and offered to join me. He was home on leave from his work as a Resident Magistrate in Uganda where I had stayed with him the previous year during our family caravan trip through Africa, which I described in the October 1954 number of *The Geographical Magazine.* He had just recovered from various tropical fevers and we were both in the ranks of the over-forties, so we agreed that our best plan would be to make a general reconnaissance of the mountains, climbing only an occasional major peak.

We were astonished when it came to buying maps and guide-books to find that practically nothing existed in English; and during our fortnight we did not meet one other British climber or see a single entry in English in any of the hut-books. Yet these mountains provide a delightful variety ranging in difficulty from flower-scattered passes to ascents of the 2500-foot north face of the Vignemale or the equally formidable cliffs of the Pic du Midi d'Ossau; and there are any number of excellent huts, on both the French and Spanish sides.

The whole area is full of historical interest. Some of the oldest secrets of the human race were revealed in the prehistoric finds in the Pyrenees. Wellington pursued Marshal Soult into France through the pass of Roncesvalles where a thousand years before Roland met his death with the twelve peers of Charlemagne, crushed by rocks thrown down on them by the Basques. It was Roland who with his great sword Durandel cleft the huge fissure in the Cirque de Gavarnie which is now called the Brèche de Roland.

To a naturalist or geographer the two sides of the range present the most astonishing contrast—a change in vegetation and scenery that strikes one the very moment one crosses the watershed. On the French side the vast level fertile plain of Pau and Tarbes gives way suddenly to a system of high rocky ridges separated by deep valleys, many of which contain a well-constructed road. These valleys are unbelievably lush and green and in the upper pastures flocks of fat sheep and cattle crop the rich grass. Great forests of pine and beech sprawl far up the steep hillsides to meet formidable peaks whose dark rocky precipices are relieved by the white streaks of torrents and waterfalls. On the Spanish side of the Central Pyrenees the high arid plateau of Aragon takes the place of wooded foothills; pine and beech forests are varied by scrub, mostly yellowish box bushes, and remarkable cañons with steep terraced rock walls run far in towards the main range. Roads are comparatively few and the country is sparsely populated.

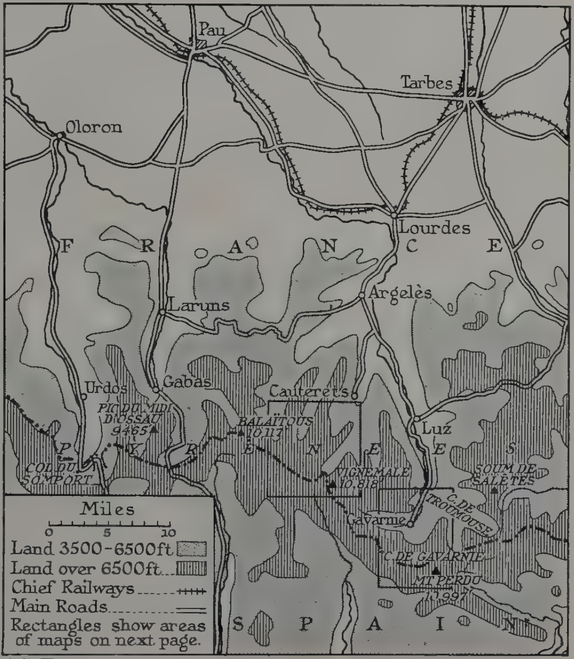
We made our base at Cauterets, some twenty miles south of Lourdes. This mountain village, with its narrow streets flanked chiefly by hotels, lies at the junction of two deep valleys whose pine-clad slopes rise to grassy alps; but we found it too much of a tourist resort for our taste and a training walk up towards the mountains filled us with a desire to visit them as soon as possible. The next day we were on our way. A bus took us and our heavy rucksacks to Pont d'Espagne, the starting-point for the Vignemale which was to be our first climb. When we arrived there were already fifty charabancs and cars in the car park and we shared our admiration of the waterfall with several hundred other people. Leaving the crowd behind, we set off up the steep path to the Lac de Gaube. Beyond its blue waters we could see the north wall of the Pique Longue de Vignemale framed by steep green hillsides rising above stunted pines; it was an idyllic scene which even the pleasure-boats on the lake and the hotel beside it could not spoil.

Two thousand feet above the lake we had the valley almost to ourselves except for a herd of pale Jersey-coloured Pyrenean cattle, the musical tinkle of whose bells mingled pleasantly with the querulous calls of choughs. Most of the flowers were already over, but a few late *alpenrosen* still bloomed among the rocks, and when we reached the flat basin known as the Grandes Oulettes we found the turf starred with gentians, potentillas and saxifrages. Soon we left these for the steeply zigzagging track up to the Col d'Ossoue, from the far side of which we looked across to the peaks forming the western end of the great Cirque de Gavarnie, with Mont Perdu just showing behind it. On the right, now hidden from view, was the Pique Longue, the highest point of the Vignemale, which we proposed to tackle in the morning. The Grand Glacier d'Ossoue, over a mile in length and the largest glacier in the Pyrenees, is cradled in a great semicircle of peaks of which the Vignemale is the highest, and flows eastward to drain into the Gavarnie valley.

We stayed the night at the Baysselance Hut which, like most of those on the French side, is the property of the French Alpine Club. It can accommodate fifty and is looked after by a guardian in the summer. We shared it with half-a-dozen French climbers, including two guides, a Swiss couple and a lone Spaniard. The chatter of the guides kept us awake late but nevertheless, after a breakfast of coffee and bread and honey, we were off by 5.45—even so almost the last away.

We followed the footpath for a mile down towards Gavarnie then, leaving our rucksacks, doubled back up the left lateral moraine of the Grand Glacier d'Ossoue. We roped up when we reached the ice and for an hour we ascended the glacier to the foot of the rather crumbly rocks which led easily to the summit of the Pique Longue.

The whole party from the Hut was now assembled on the summit, exclaiming about the view in various languages and taking photographs. In all directions, particularly to the east and west, peaks broke the skyline. They were not so bold or shapely as Alpine summits, nor were the glaciers so conspicuous, but the mountains impressed by sheer numbers. One realized that the Pyrenees are indeed one of the great ranges of Europe. Clouds were forming over the massive Balaïtous and the Pic du Midi d'Ossau to the north-west, but below us we could just make out the dot of the Wallon Hut in the wide green Marcadau Valley, and we caught a glimpse of the smiling Lac de Gaube surrounded by pine woods.



A. J. Thornton

The descent over the rock and glacier was soon accomplished and four hours after leaving them we picked up our rucksacks and continued on our way to Gavarnie. The path first descended steeply past a series of gorges and waterfalls and then traversed a wide level plain, gay with flowers, across the lower end of which a dam was being built; indeed the whole of the lower part of the descent showed untidy evidence of a vast hydro-electric scheme—but one advantage of this was that a man in a jeep offered us a lift down the last five miles of what would have been a very tedious walk in the heat of a sultry afternoon.

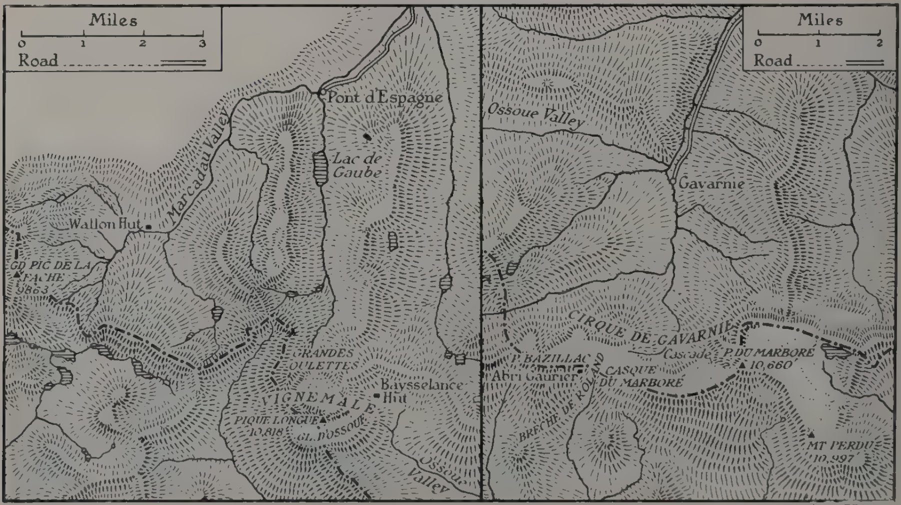
Gavarnie presented an astonishing spectacle. The road from the north stops here, and the village seemed to be one huge park for hundreds of charabancs and cars whose occupants, on foot or on the backs of countless mules and donkeys, followed a rough path for several miles to the foot of the Cirque.

The Cirque de Gavarnie is certainly the most striking feature in the whole of the Pyrenees. It is of almost Himalayan grandeur and I know nothing comparable in Europe. It is formed by a semicircle of 10,000-foot peaks some five miles in diameter. From the stony floor of the amphitheatre to the summit of the Marboré, the highest of the peaks forming the Cirque, is more than 5000 feet. The skyline ridge is set back only a little distance from the forbidding wall of almost vertical grey rock down the centre of which leaps the 1300-foot Cascade de Gavarnie, one of the highest waterfalls in Europe. Along the inside of the rim are a number of small steep glaciers, and it is the streams of water melting from these that unite to feed the Cascade.

Having stocked up with food and wine we crossed the stream of humanity going to and from the Cirque and made our way to a small hut high up on the east side of the valley. Here, as in all the Gavarnie country, the grassy slopes were covered with banks of violet-blue iris, a foot or eighteen inches in height, with a large yellow spot on the lower petal; and there were fritillaries, pale blue forget-me-nots, gentians, dianthus and potentillas as well as exquisite swallow-tail and Apollo butterflies.

The hut was semi-derelict and smelt vilely of the sheep which had scrambled through the windows in search of shelter. There was a huge open fireplace, full of empty tins, and a concrete sleeping bench which we made tolerably comfortable by spreading a layer of aconite fronds—the only suitable plants we could find above the tree line—beneath our eiderdown sleeping-bags.

We were woken by cows rubbing themselves against the corners of the hut and turned out to see a splendid dawn. To the west we could see the sun lighting up the rocky curve of the Vignemale enclosing the great glacier of yesterday's climb, and southwestwards over a wooded spur we looked across the Cirque to the astonishing Brèche de Roland. As it lies a little back from the main curve of the Cirque, between the Pic Bazillac and the Casque, one does not really appreciate the Brèche from the floor of the valley. It is a gigantic open door in the rampart wall,



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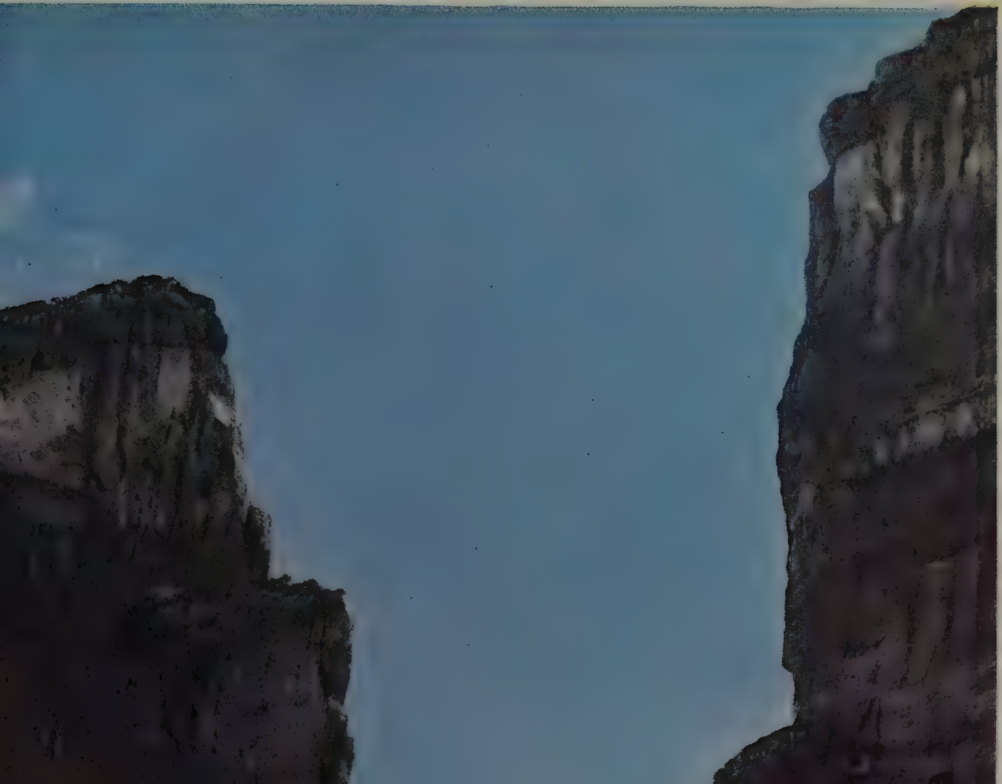
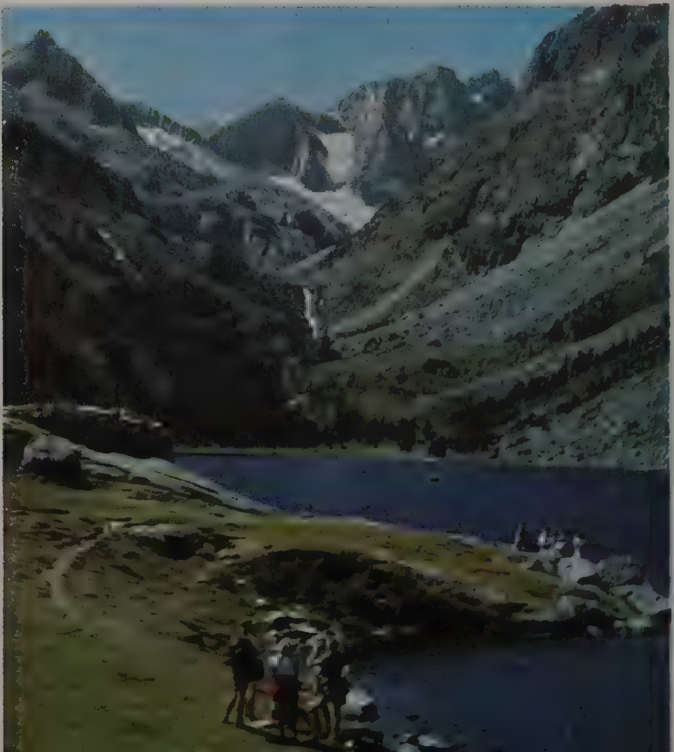


All photographs except three are Ektachromes by the author

The Brèche de Roland: the great gateway between Spain and France which, according to legend, was cleft by a single stroke of Roland's sword during the battle of Roncesvalles. Fifty feet wide, with walls 300 feet high, it breaches the outer rim of the vast amphitheatre of the Cirque de Gavarnie in the Central Pyrenees. The figures on the glacier give some idea of its immense size

(Left) *The* 10,818-*foot Pique Longue de Vignemale, the highest peak on the French side of the Pyrenees, rising to the right of the Brèche de Gaube, with, below it, the Glacier des Oulettes which is the only one in the Pyrenees that descends a valley. There are several routes up this* 2500-*foot north face of the peak, but the easiest way to the summit lies up the Glacier d'Ossoue—the largest in the range—on the other side.* (Below) *Looking south towards the Vignemale from beside the Lac de Gaube. This delightful lake is rather apt to be crowded with tourists in the summer as it can be reached by an easy path from Pont d'Espagne, two miles to the north of it. Few people go further up the valley; the only exits are by high passes to the neighbouring valleys of Marcadau to the west and Latour to the east*



The view south from the Soum de Salètes (9760 feet) towards Spain. To the left are the peaks of the Cirque de Troumouse; those to the right are the easternmost summits of the Cirque de Gavarnie

50 feet wide and with vertical sides more than 300 feet in height. At its foot, adding to its impressive appearance, is the steep Glacier de la Brèche.

We breakfasted and packed up hurriedly, then zigzagged down between the dewy irises before even the first tourist had appeared upon the pilgrim path to the Cirque. Our objective was the summit of Mont Perdu but, as we could not reach it and return to our base at Cauterets in a single day, we planned to spend the night in a shelter known as the Abri Gaurier just on the south side of the Brèche de Roland.

Our way to the Brèche led up an exacting path from the foot of the Cirque. Water from the glacier above dripped down the steep slopes which were therefore covered with flowers. I found a very lovely dark blue aquilegia, a pink dianthus with saw-edged petals, two kinds of toad-flax and masses of a mauve aster with a yellow centre.

After a halt for lunch we climbed the steep glacier to the Brèche. As we rose we could look eastward across the head of the Cirque to see the whole crescent of summits forming this remarkable feature. But Mont Perdu still lived up to its name.

At last we reached the Brèche itself and rejoiced in the cool breeze whistling through this airy gap, surely the most extraordinary pass in the world. Vertical walls of rock rose far above us on either side of the Brèche. On the southern side the ground fell away parched and brown; two vultures soared overhead and herds of scraggy goats took the place of the fat cattle and sheep we had been accustomed to. Several ranges of low lavender hills separated us from the dried-up fields of Aragon; and only a few miles to the south, though we could see nothing of them, were the cañons of the Spanish National Park of Ordesa.

We followed a narrow path which runs between the foot of great rust-brown walls of rock bordering the Brèche and the steep screes to the south. At one point we found a dank cave—presumably the Abri Gaurier—with walls of ice, but it was far too insanitary to tempt us, so we chose for our camp that night a place where the rocks overhung sufficiently to keep off the rain, with a low wall which would prevent us from rolling down the screes in our sleep. Here we

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(Above) *The Cirque de Gavarnie, "the most striking single feature in the whole of the Pyrenees", is an amphitheatre of* 10,000-*foot mountain peaks. The Cascade de Gavarnie, dropping* 1300 *feet from its centre, is one of the highest waterfalls in Europe.* (Left) *The Pyrenees are as rich as the Alps in endemic species of flora. One of these is the beautiful* Iris xiphiodes (*though it has long been cultivated in Britain under the name English Iris*). *About two feet high, it grows in profusion on the grassy banks and pastures around Gavarnie. Countless tourists who climb to the foot of the Cirque raid it mercilessly and often thoughtlessly abandon great bunches of it beside the path. It is at its best in June and July, though some perfect groups can still be found on the higher slopes in August.* (Opposite, top) *The delightful little* Scutellaria Alpina (*so called from the shield-shaped calyx*) *is closely related to the English Skullcap. It is a native of the Pyrenees as well as the Western Alps and Siberia where it is found on dry stony ground.* (Opposite, bottom) Dianthus deltoides, *the Maiden Pink, is a rare native of England where it grows on dry gravelly banks and pastures. It is commonly found in Alpine parts of Europe but never in more profusion than on a grassy slope beside the Cirque*

Both Kodachromes by D. N. Paton

passed a very comfortable night, waking up occasionally to watch the stars and a half-moon wheeling over the hills of Spain.

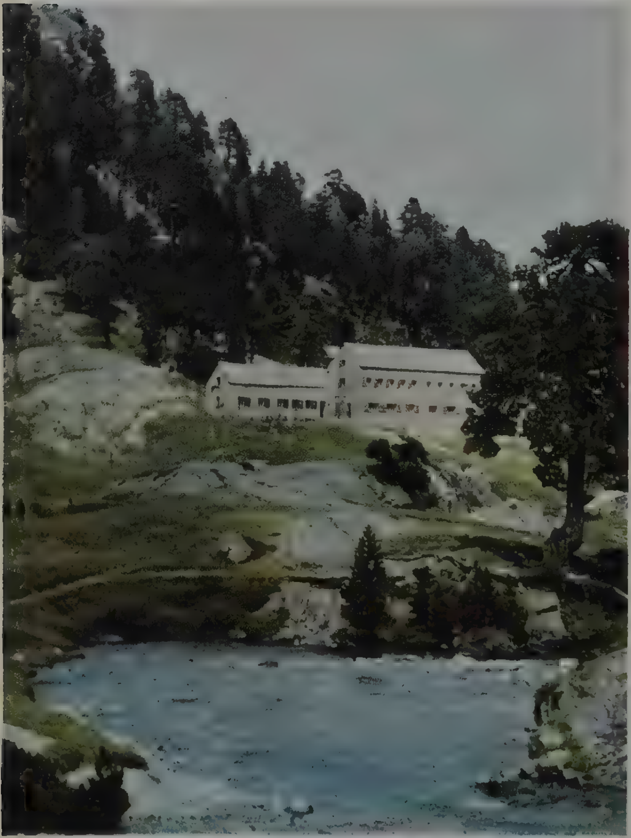
Leaving our rucksacks at the bivouac, we were away at dawn, and keeping to the south of the Brèche we took the track known as Pas des Izards, or Chamois path, at the foot of the steep walls of the Casque du Marboré.

After this we followed a series of ledges up the south side or back of the mountains forming the Cirque. At one stage we looked over the Col de la Cascade down to the floor of the Cirque more than 4000 feet below us. A small glacier lay immediately below the Col and beyond it we could see the spray blown back from the Cascade. Here we crossed the shoulder of the Pic du Marboré and descended to a small desolate green lake before making our way up a long moraine and a snowfield to the summit of Mont Perdu. The climb was so easy that we did not once have to rope up.

On the summit we found a log-book in a zinc case placed there by the Gerona University Mountaineering Club. All the names were Spanish or French and it was interesting to note that all the Spaniards were Catalonians. As we were adding our names, I saw three small wall-creepers pass over the summit with their desultory butterfly-like flight. They were so near that I could make out the long slender curved bill and the white-spotted wings with crimson shoulders.

We were down at the desolate lake again by lunch-time and eleven-and-a-half hours after leaving our bivouac we were in Gavarnie catching the bus for Cauterets, a good dinner and a comfortable bed.

After a morning's rest in Cauterets, we took the bus once more to Pont d'Espagne and wandered up the Marcadau Valley to the Wallon Hut, which is set high up in the mountains. We came to the conclusion that it would be a far better—and far more



The large and comfortable Wallon Hut lies some six miles from Cauterets at the head of the Marcadau Valley within easy reach of such major climbs as the Vignemale and the Balaïtous

(Above) *The author by a shrine at the summit of the Grande Fache, above the Marcadau Valley.* (Below) *The summit of the Balaïtous just appears above the third cow from the left in this photograph, taken at* 6000 *feet. Even at this high altitude the plump Pyrenean cattle find good pasture*

A village between the Col du Somport and Urdos on the road taken by the author and his family on their return journey from Spain. The rich, unbelievably green meadows and forests of beech and pine on the French side of the Pyrenees are a sudden contrast to the brown and barren Spanish landscape economical—base than Cauterets for climbing the high peaks at the western end of the Central Pyrenees. It is, moreover, an ideal place to spend one's off days—fishing, bathing in the clear cold river pools or bird-watching and botanizing in the delectable upper valleys and pastures. Your baggage can be brought up the half-dozen miles from Pont d'Espagne on mule-back and you can either live *en pension* for less than £1 a day or you can have a bed in a dormitory for 2s. a night and cook your own meals.

We stayed on this occasion only a couple of days, climbing some of the many peaks near the hut and resting. Our next objective was the 10,117-foot Balaïtous, after which we intended to continue westwards to the Pic du Midi d'Ossau, which was to be the last of our big climbs.

Our path led over the Col de la Fache from which we turned aside to climb the Grand Pic de la Fache, whose summit afforded us a wonderful view over the country ahead of us to the Balaïtous and Pic du Midi.

That night was spent in a Spanish hut lost in some hillocks in the middle of the Piedrafitta valley. While we were cooking our evening meal, a group of Spaniards from Barcelona University arrived, followed later by a solitary French climber. Finally we were joined by a Castilian trout-fisherman and two local shepherds who came in ostensibly to ask for a match. Goatskin wine-flasks were passed round and the students sang songs including "Auld Lang Syne" in Spanish to the accompaniment of a mouth-organ and a penny whistle.

Next morning, after breakfast, we were off before 6 a.m. and soon caught up the solitary Frenchman who was in difficulties on the Brèche Latour, the lowest point on the ridge between the Frondella and Balaïtous. We forced a route up an exceedingly steep gully (the only bit of really difficult rock climbing on the whole trip) only to find at the top a row of pitons (metal spikes) coming up another gully, and to realize we had mistaken the route. As a result of this delay we were not on the great domed summit of the Balaïtous until mid-day. As usual the Vignemale dominated the view, but the Pic du Midi, in the opposite direction, held our attention not only because of its striking outline but also because it was our next objective.

We descended by a route known as La Grande Diagonale and soon reached the turquoise lakes of Arriel. A long steep pull in the heat of the afternoon took us to the Col d'Arrémoulit and an hour later we reached the hut of the same name and refreshed ourselves with a bathe in the icy lake. The Refuge d'Arrémoulit is beautifully situated on the edge of the lake between the high rugged granite pyramids of neighbouring peaks. Our solitary enjoyment of this peaceful scene was marred, however, by the arrival of a dozen French schoolboys in the charge of four adults. As the hut was only twelve feet by twenty we were somewhat crowded!

We waited until they had all left next morning and then followed a high-level path round to the top of the Col d'Arrius. From here we had a splendid view of the road up the Col du Portalet which we had to cross, then up through beech and pine forests to the great rock tooth of the Pic du Midi.

On the way down to the road we passed two shepherds rounding up some hundreds of sheep. They were accompanied by several huge Pyrenean hounds, the first we had seen, like St Bernards in size and shape, but with long cream-coloured coats. They bounded towards us most menacingly until called off by the shepherds.

We crossed the road to Spain and after a long climb in which we lost the track in a moraine we at last reached the Pombie Hut at the foot of the tremendous south-east face of the Pic du Midi. That evening a perfect shadow of the cloven outline of the Pic du Midi was cast on the hillside on the other side of the pass and above it rose the massive summit of the Balaïtous, still bathed in amber sunshine.

As we hoped to get back to Cauterets that day, we left the hut at 6 a.m. and by way of the Col de Suzon were at the summit, 9465 feet up, three hours later. As usual on regular routes in the Pyrenees, a number of pitons helped one up any of the awkward places and we did not have to use a rope. Owing to its isolation, its characteristic shape and the formidable nature of its precipices, this, to my mind, is the most impressive, though by no means the highest, mountain in the range.

Before mid-day we reached the road-head at Bious-Artigues, passing through fields of autumn crocus and stuffing ourselves with bilberries on the way.

We had lunch at Gabas, one of the last haunts of the Pyrenean bear, and that evening caught a bus back to Cauterets.

Which Pass Did Hannibal Cross?

by SIR GAVIN DE BEER, F.R.S.

The author, who is Director of the Natural History Museum, as both scientist and historian puts forward in his book Alps and Elephants, *just published by Geoffrey Bles, solutions of exceptional authority for a problem that has long puzzled classical scholars: that of Hannibal's route across the Alps. The following extracts give (I) a summary of the narratives of Polybius and Livy; (II) the author's commentary on these; and (III) his identification of Hannibal's elephants. Other parts of the book justify in detail his tracing of the line of march followed by Hannibal*

I

FROM "the ascent towards the Alps" to the plains of Italy the distance was given by Polybius as 1200 stadia (or 213 kilometres), and he not only added that it was accomplished in fifteen days but recorded the details of what happened on each day. For vividness and incisiveness it would be impossible to improve on Polybius's narrative which might apply to a modern operation of war if armoured fighting vehicles were substituted for armoured fighting animals.

It is known from Polybius himself that he went by Hannibal's route over the Alps, some sixty years after the event. Furthermore he lived in the household of the Scipios and was present at the capture of Carthage. Polybius's version of Hannibal's march through the Alps deserves the utmost respect, and I therefore give an extract from it here in free translation, with the addition of details from Livy's account and comments of my own between square brackets to show that they are not from Polybius.

After covering 800 stadia in ten days' march along the river, Hannibal began the ascent towards the Alps, and ran into danger. While his army was in open country the Allobroges hovered around but at a distance, afraid of the horsemen and of the escort [from Brancus]. But when these turned home Hannibal's men began to negotiate difficult ground. The chiefs of the Allobroges then concentrated some troops and occupied favourable positions covering the route by which Hannibal's men must pass. If the Gauls had concealed their intention they would have completely annihilated the Carthaginian army; but they were discovered, and although they caused much loss to Hannibal's men they suffered no less themselves.

Knowing that the Gauls occupied commanding positions, Hannibal encamped near the pass: *pros tais hyperbolais*, and sent out some of his Gaulish guides to reconnoitre the enemy's intentions. They accomplished their mission and returned with the intelligence that while the enemy stood to in their positions all day, they retired at night to a neighbouring town. Hannibal thereupon made his plans and set his army in march again without any attempt at concealment and moved his camp close to the enemy. At nightfall he lighted his camp-fires and left the greater part of his army in camp, but with some lightly armed picked troops he crossed the pass during the night and occupied the positions which the enemy had abandoned when they had retired to the town in accordance with their custom.

[Second day.] At dawn the Gauls appreciated what had happened and at first gave up their intentions. But when they saw the pack-animals and horses threading their way painfully and slowly through the difficult passage they were tempted to attack the column on its march. As they fell upon the Carthaginians in several places they inflicted many casualties on the men and particularly on the pack-animals and horses, not so much because of their own offensive action as because of the dangerous nature of the terrain. The track was not only narrow and rough but bordered by a sheer drop, and many animals fell to the bottom with their loads at each alarm.

It was particularly the wounded horses which caused these panics, for some of them, maddened by their wounds, turned back onto the pack-animals, while others bolting forwards brushed aside everything that they met in the pass and caused enormous confusion.

When Hannibal observed this situation and realized that even the troops who escaped from the present trap would be doomed if the convoy of supplies was lost, he led the men who had occupied the covering positions during the night and raced down to the help of the column engaged in the pass. In the ensuing action many of the enemy were killed, because Hannibal fell on them from higher ground; but his own losses were no less great, the confusion having increased with the shouting and the clash of the engagement.

After killing a great many of the Allobroges and putting the remainder to flight, Hannibal drove them to their homes. The mob of pack-animals and horses were then able laboriously and painfully to get to the end of the dangerous pitch, and Hannibal made for the town from which the enemy had attacked him. Finding it practically empty as the inhabitants had all been tempted out by the promise of booty, he captured it together with much that was very useful for his present and future needs, for it included many pack-animals and horses and the drivers taken with them, and corn and slaughter-animals sufficient to feed his army for two or three days. Most important of all, he imposed a healthy respect on the enemy, with the result that none dared to attack him light-heartedly on his ascent to the Alps.

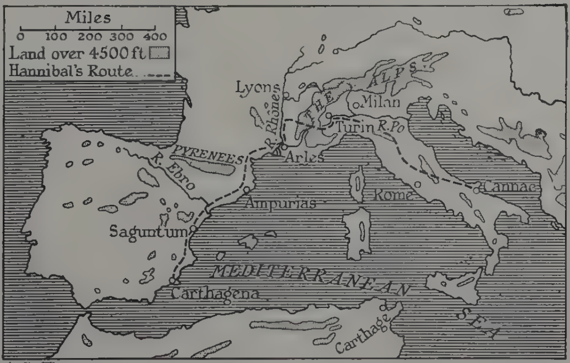
Hannibal encamped in the town and stayed there one whole day [third day] before setting out again on his march.

[Fourth to seventh day.] On the following day Hannibal led his army in comparative safety [Livy: marching in open country: *campestri maxime itinere*] but on the fourth day [after leaving the town] he again ran into danger. The peoples who lived on his line of march had conspired to deceive him and came to him bearing branches and wreaths, which are symbols of friendship among the barbarians, similar to the caduceus with the Greeks. Very suspicious of this profession of amity, Hannibal scrutinized their intentions. They said that they knew of the capture of the town and of the ruin which had befallen all who had tried to oppose him, and that that was the reason why they had come. They wished neither to occasion nor to receive any harm and offered to give hostages.

Hannibal remained suspicious and unwilling to trust them, but he reflected that by accepting their offer he might mollify those who had come to him and make them more conciliatory, whereas if he rebutted them he would make them declared enemies. He therefore agreed to their proposal and feigned friendship with them. The barbarians gave hostages and supplied abundant cattle, and placed themselves unrestrictedly in his hands. Hannibal trusted them so far as to use them as guides in that difficult country, and these men led the columns for two days, after which the local inhabitants who had concentrated and shadowed the flank of the column attacked it while it was threading on its way through a gorge with a precipice on one side and an inaccessible cliff-wall on the other.

In this situation Hannibal's army might have been annihilated if he had not suspected some such critical development and taken steps to meet it. He had accordingly placed the cavalry and the convoy at the head of the column and stationed the heavily armed infantry in the rear. As these were on their guard the impact of the enemy was reduced and the damage diminished. Nevertheless many men, horses and pack-animals became casualties. As the enemy occupied high ground and attacked everything that was below them, they rolled down rocks and boulders and caused such confusion and danger that Hannibal was obliged to bivouac on a large bare rock: *leukopetron ochuron*, separated from his horses and pack-animals, to cover them as they filed through the gorge with great difficulty during the night.

[Eighth day.] On the following morning, the enemy having withdrawn, Hannibal rejoined his horses and pack-animals and advanced towards the highest passes of the Alps: *pros tas hyperbolas tas anōtatō tōn Alpeōn.* He was no longer subjected to any general attack by the barbarians but fought small parties of them here and there, in front and in rear.



A. J. Thornton

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The approach to the Col de Grimone. It is reasonably certain that Hannibal's "ascent towards the Alps" was over this pass and that it was the site of the first battle on his march through them

They succeeded in capturing some pack-animals in these skirmishes, Hannibal made the best use of his elephants, for when they led the column the enemy dared not attack, frightened by the unfamiliar appearance of the beasts.

[Ninth to eleventh day.] On the ninth day [from the ascent towards the Alps] [Livy: after losing the way many times in impasses: *per invia pleraque et errores*, either because of the treachery of the guides or in attempts to find the right way without them] Hannibal reached the pass where he encamped and remained for two days. He wanted to rest the men who had got through with him and to give time for the remainder to arrive. Many horses that had panicked and bolted and many pack-animals that had thrown their loads rejoined the column.

Snow was already accumulating on the summits, for the time of the year was approaching the setting of the Pleiades. The men were discouraged by the hardships which they had suffered and the prospect of those which were still in store for them. Hannibal assembled the army because he had a unique opportunity to see Italy: *tēs Italias enargeian* [Livy: *longe ac late prospectus*] since the mountains were placed in such a manner as to suggest a row of battlements surrounding Italy. He showed his men the plains of the river Po and reminded them of the friendly feelings of the Gauls who inhabited them. At the same time he pointed out the direction in which Rome lay, and in this way raised their morale.

[Twelfth day.] On the following morning Hannibal struck camp and began the descent, during which he encountered no enemy except single individuals who slipped through the lines bent on sabotage. But the nature of the ground and the snow inflicted as much loss as he had suffered on the ascent. The path was narrow and steep, the snow hid the track, and any man who stepped beside it and slipped fell over the precipice.

Nevertheless the troops braved this ordeal, being accustomed to difficulties. But they came to a place where neither the elephants nor the pack-animals could get by, because the track was too narrow. A landslip had carried away the path for a distance of 400 metres, and a recent slip had made it worse. The men began to get discouraged again and broke ranks. Hannibal first tried to turn this difficult place, but the snow that had fallen made any detour impossible, and he gave up the attempt.

The conditions were peculiar and extraordinary. On the old snow of the previous winter, fresh snow had recently fallen which was easy to get a foothold in because it was soft and not yet very deep. But when the foot reached the old snow underneath, which was very hard, frozen and slippery, there was no foothold. The men slid and glided as on wet mud. The sequel was even worse, for when the men lost their foothold and tried to get up on hands and knees they slid farther on the steep slopes.

When the pack-animals fell they were able to stamp through the old snow, but when they had penetrated it they remained stuck with their loads by their weight and the compactness of the old snow.

Hannibal therefore gave up his attempt and bivouacked on the crest after scraping away the snow. He then gave orders to build up the eroded track.

[Thirteenth day.] One day's work was sufficient to make the track passable for the horses and pack-animals. They were passed through at once, and Hannibal established a camp below the snowline. He sent the animals to graze and ordered the Numidian horsemen to relieve one another in working at the repair of the track. [Livy. It was necessary to remove a rock. Trees were felled and the wood piled on to it in a huge pyre which was lighted and burned fiercely with the help of a fortunate breeze. The hot stone was then drenched with vinegar to disintegrate it and attacked with pickaxes.] It was only with great difficulty that he was able to get the elephants through after they had endured three days' cruel suffering from hunger, because the summits of the Alps and the approaches to the passes are devoid of vegetation and bare owing to the snow. Lower down on both sides they are covered with bushes and forests and are habitable.

[Fourteenth and fifteenth days.] Hannibal reassembled his army and reached the plains on the third day after passing the precipices. He had lost many men from enemy action and in crossing rivers during the march, but he had also suffered many casualties among his men, horses and pack-animals, in the ravines and difficult places in the Alps. However, after covering the distance from Cartha-

Montdauphin and the entrance to the Queyras Valley, at the junction of the Guil and the Durance. Perhaps owing to the treachery of local Gaulish guides, Hannibal took the route up the Guil to the Col de la Traversette instead of the much easier one by way of the Durance and Mont Genèvre

gena in five months and the passage of the Alps in fifteen days, he boldly entered the plains of the Po and the territory of the Insubres. He had saved 12,000 of his African infantry, 8000 Spaniards, and at most 6000 cavalry, as he himself explained in the inscription which he placed on Cape Lacinium. [He had lost 18,000 foot soldiers and 2000 horsemen.]

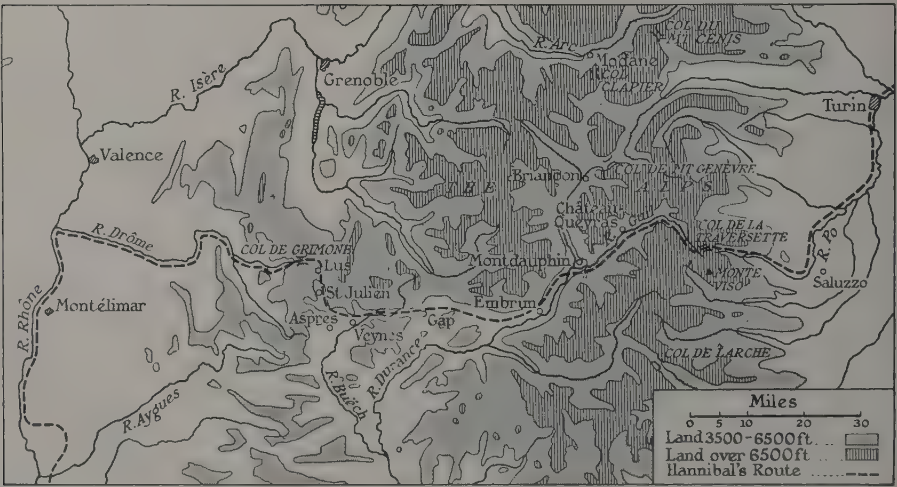
II

It is clear that the first battle was fought over a mountain pass, a *hyperbolē*, through which the track passed on a ledge in a gorge with accessible heights overlooking it. Hannibal went up one side of the pass and down the other where the Gauls' town was situated.

That the place was a mountain pass restricts its location to the range of hills bordering the Rhône valley on the east, north of the Aygues and south of the Isère. Through this range there is a pass leading eastwards: the Col de Grimone, which has a little gorge, the Gorges des Gas. Nowhere but in this region can a suitable pass be found at a distance of 1400 stadia from Arles, and I am therefore almost certain that "the ascent towards the Alps" and the site of the first battle was at the Col de Grimone, as I have already explained.

Some have thought that the town which Hannibal occupied belonged to the Allobroges, but this is impossible because Polybius stated definitely that after the first battle the Allobroges returned to their homes, and if this had been in the town Hannibal would not have found it deserted. The town must therefore have belonged to a local tribe of Gauls who were trying to oppose Hannibal's passage. Whosoever it was, it must have been in a very fertile district or Hannibal would not have found three days' food for his army in it. This represented 150,000 rations. The town must therefore have been situated on the eastern foot of the range of the hills that Hannibal had crossed. The country there opens out into the wide valley of the middle reaches of the Durance, extending from Aspres-sur-Buëch in the west to Embrun in the east. Near Aspres are many ruins of Gallo-Roman settlements including those of the town of Mons Seleucus, known today as La Bâtie-Montsaléon. I do not claim that this was the town that Hannibal captured, but I do claim that the presence of a town of such importance in this region is evidence that a town able to supply 150,000 rations might also have been situated in this fertile neighbourhood where olives grow. La Bâtie-Montsaléon is about 35 kilometres from the Col de Grimone through Lus-la-Croix-Haute, St Julien-en-Beauchène, and Aspres. This neighbourhood was therefore within Hannibal's reach on the second day of his march across the Alps, with the next day available for the rest of the army to catch up with the van.

From the captured town, Hannibal had four good days' marching, and the wide valley of the middle reaches of the Durance would have been very suitable for this. The distance from La Bâtie-Montsaléon to Montdauphin where the open country ceases is about 100



A. J. Thornton

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The gorges of the Guil. Here, on the seventh day of his Alpine march, Hannibal was again attacked in a steep valley through which his forces were obliged to pass in single file, while rocks rained down on them kilometres through Veynes, Gap, and Embrun, and this would occupy Hannibal's fourth to seventh days at a rate of march of 25 kilometres a day.

At Montdauphin the route forks. To the left the track continues along the Durance to the Mont Genèvre; to the right the gorges of the river Guil, known as the Combe du Queyras, lead to a number of passes including the Col de la Traversette. There is no doubt that Hannibal would have had a much easier time if he had followed the Durance to Briançon and the pass of the Mont Genèvre. But he had a very difficult time indeed, and, perhaps as a result of the guides' treachery, the army was engaged in a gorge on the seventh day. This gorge seems to have been deeper than the first, for the whole army was strung along it in file and Hannibal was not able to cover his convoy by operating on its flank as in the first battle. Here, all that Hannibal could do was to clear the road ahead with his elephants and seize a position on a large rock and wait for the convoy to come through while its rear was protected by the heavy infantry, and all along the route the Gauls rained rocks on them from above as well as attacking in front and rear.

The Combe du Queyras may have been this gorge; indeed there is no other at the appropriate distance in the basin of the Durance leading to a pass such as that which Hannibal crossed. At the far end of it is a large rock, 25 kilometres from Montdauphin, in the middle of the valley at Château-Queyras on which the present town is built. This is most likely to have been Polybius's "bare rock": *leukopetron ochuron*, where Hannibal bivouacked. The modern road is at the bottom of the gorge, but the ancient track

The "bare rock" on which Hannibal bivouacked on the night of the seventh day : Château-Queyras, in the valley of the Guil. From its height he was able to cover his horses and pack-animals as they filed through the gorge in the dark, towards the Col de la Traversette at the head of the valley

urtesy of the French Government Tourist Office

By courtesy of E.P.T., Cu

Monte Viso and the Alps from the east, seen from an eminence above the valley of the headwaters of the Po. The Col de la Traversette lies between the two highest peaks in the centre. It was from there on the eleventh day of his march that Hannibal showed his troops Italy and the way to Rome

must have been at a higher level, where it is known that it ran in Roman times because of the inscription found at Les Escoyères.

Above Château-Queyras the valley opens out into a pleasant verdant basin.

From Château-Queyras to the Col de la Traversette the distance is 25 kilometres, which would have occupied the ninth day for Hannibal's vanguard, while the rest of the army came up on the following two days.

There are four reasons why the Col de la Traversette must be the strongest competitor for the honour of having been Hannibal's pass. The first is that it is very high, nearly 10,000 feet above sea-level. Only on such a high pass could it be expected that the previous winter's snow would have survived the summer and still lain thickly enough to cause Hannibal's men and animals the great trouble which it did. In that part of the Alps the snowline today is roughly about 10,000 feet above sea-level, and the question naturally arises whether in Hannibal's time the climate was the same as at present. A final answer to that cannot yet be given, but indications can already be gathered from four independent lines of work that it was.

Estimates of the general average temperature of the world have been obtained from studies on the former extension of glaciers, on the height of the tree-line, on the analysis of pollen-grains in peat-bogs, and on deposition of the sediments at the bottom of the Atlantic Ocean.

From all these it can be concluded that the climatic conditions in Hannibal's time were substantially the same as at present, and that the snow-line was no lower.

The second reason is that the Col de la Traversette is dangerous for an army with pack-animals and elephants. It has a difficult approach through a gorge, and a difficult descent, bad enough to cause Hannibal to suffer the casualties which he did, and for it to become profitable to pierce a tunnel a few dozen feet under its summit in A.D. 1480 to facilitate passage.

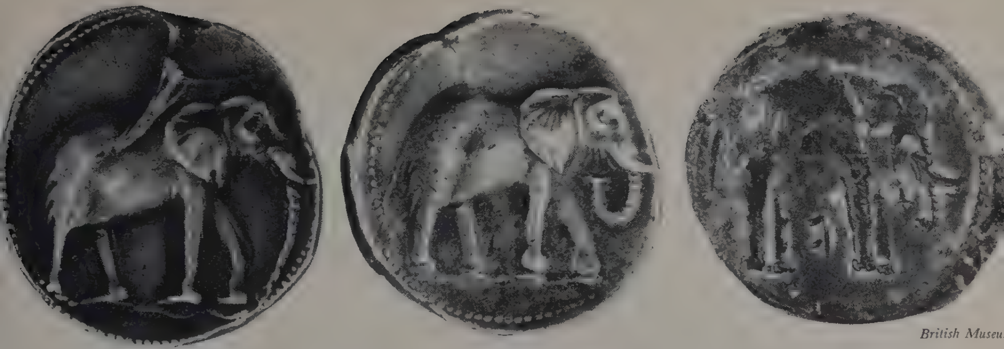
Thirdly, the Col de la Traversette is one of the three passes in all the chain of the western Alps from which there is a view of the plains of Italy. It shares this rare property with the Col de Malaure and the Col Clapier. The former of these is a knife-edge, close to the Col de la Traversette, but with nothing to be said in its favour either as regards its approach or descent. The latter is only accessible from Modane in the valley of the Arc, a tributary of the Isère, by which route there is no documentary or scientific evidence that Hannibal went at all.

Since passes are in general the lowest practicable places where it is possible to cross over ranges of mountains, it is not surprising that from the majority of them there is no view at all of the plains on either side. A view of the plains from a pass is so rare that it would be a gratuitous piece of special pleading to assume that Polybius and Livy invented it as an attribute of Hannibal's pass if it did not exist. Polybius, it will be remembered, crossed Hannibal's pass himself.

The result of these considerations is that the Col de Larche and the Mont Genèvre must be rejected as competitors for Hannibal's pass because they are too low and too easy and have no view of the plains of Lombardy. The same three objections apply to the Mont Cenis with the addition of a fourth that it does not lead out of the Durance basin, but that of the Isère. As for the Little St Bernard which was so long the favourite for Hannibal's pass, it suffers not only from the same four objections as the Mont Cenis but also from two more: the distance by its route is too great from the "ascent towards the Alps" to the plains of Italy, and it does not lead into the country of the Taurini. In other words it has the least to be said for it of them all. The Col Clapier might be regarded as sufficiently high and dangerous on its descent and it has

The Alps, with Monte Viso towering above the plains of the Po: a panorama looking north from the Maritime Alps towards the mountains down which Hannibal descended from the Col de la Traversette

By courtesy of E.P.T., Cuneo, Italy



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(Left *and* middle) *African elephants on Carthaginian coins of 220 B.C. Most of Hannibal's elephants were African, but at least one,* Surus, *the "bravest of them all" which he perhaps rode, was Indian; it was very possibly the one depicted on* (right) *this Etrurian coin of 217 B.C.*

a view of the plains; but it leads out of the basin of the Isère and not that of the Durance.

The Col de la Traversette is the only one which satisfies all the requirements. That the valley of the Guil through which it is reached was in general use in early times is proved by the discovery of Roman inscriptions at Les Escoyères in the valley of Queyras.

From the Col de la Traversette to the plains at Saluzzo the distance is about 40 kilometres, which would have occupied Hannibal's men on the fourteenth and fifteenth days. The total distance from the Col de Grimone to Saluzzo is 220 kilometres. This may be compared with Polybius's estimate of 1200 stadia (or 213 kilometres) from "the ascent towards the Alps" to the plains of Italy.

Polybius's statement that when Hannibal had descended from the Alps he entered the territory of the Insubres must be taken as a broad picture of events after the crossing of the Alps, because according to the geographer Ptolemy the Insubres lived at Novara, Como, Milan, and Pavia, and their territory nowhere touched the Alps, from which they were separated by the Libici and the Taurini. That this is the correct interpretation of Polybius's text is clear from the sequel, in which he recorded that when Hannibal had rested his army after its ordeal which made the men almost look like savages, "he attempted to gain friendship and strike an alliance with the Taurini who lived at the foot of the mountains: *pros tē parōreiā*, were enemies of the Insubres [his allies], and mistrusted the Carthaginians. But they rejected his advances, so in three days he stormed their most important town." Livy must therefore have been right when he wrote that "all were agreed" that Hannibal came down from the Alps into the territory of the Taurini. The town of *Augusta Taurinorum* is the present Turin.

III

The identification of the nature of Hannibal's elephants is a matter of unexpected complexity and depends in part on the evidence supplied by coins. The beautiful issue of Carthaginian coins in Spain which were practically contemporary with Hannibal's campaign bear on the reverse side the image of an unmistakable African elephant. It can be distinguished from an Indian elephant by the following features:

1. The back shows a concave dip between a hump over the shoulders and another hump over the hind quarters, whereas the Indian elephant's back is an unbroken convex dome;
2. The hind quarters are almost flat instead of projecting backwards at a fairly sharp angle as in the Indian elephant;
3. The head is carried high instead of in the low position characteristic in the Indian elephant;
4. The forehead is flat instead of showing the Indian elephant's concave profile;
5. The ear is very large instead of small;
6. The trunk is marked by repeated transverse ridges instead of being smooth;
7. The tip of the trunk has two "fingers" instead of the single one at the front edge in the Indian elephant;
8. The upper part of the hind leg is masked by a fold of skin of the flank, whereas in the Indian elephant the outside of the hind leg is distinctly visible right up to the groin.

All these features can be clearly seen on the Carthaginian coins and prove beyond a doubt that Hannibal used African elephants.

The proportions of the elephant and its rider on the Carthaginian coins show that the elephant was about 8 feet high. As Sir William Gowers has shown, the African elephants used by the Egyptian Pharaohs and by the Carthaginians were of the small forest type, variety *cyclotis*, standing about 8 feet high at the shoulder, and not of the large African bush elephant race which reaches 11 feet. The latter is larger than the Indian elephant, but the Indian is larger than the African forest elephant. The ancient authors Polybius, Ctesias and Philostratos were perfectly correct when they described the African war-elephant as being no match for the Indian, and modern critics who have tried to ridicule the ancients have only succeeded in demonstrating their own ignorance of zoology.

The Carthaginians' African elephants were obtained from the foot of the Atlas mountains and the coast of Morocco where Hanno saw them about 500 B.C., Herodotus described them, and Hasdrubal Gisgo was sent to find some in 205 B.C. Suetonius Paulinus surveyed the area in A.D. 47 and particularly the forested valley of the Guir with its wild animals including the elephant. Its disappearance forms part of an Arab legend, concerning which Mr Ritchie Calder was recently shown a manuscript at the tomb of Sidi Tayeb. This saint was bitten by a snake and, as he was dying, called on the animals in the name of Allah to leave the forest of Guir, which they did six days later. In Pliny's time elephants were plentiful around Ghadames, south of Tunisia. Today the forest elephant in the west of Africa does not extend farther north than Senegal.

The Pharaohs' African elephants were obtained from the shores of the Red Sea and Eritrea, where forest elephants were still living at the time of Napier's expedition to Magdala in 1868. Today in East Africa they do not extend farther north than the areas bordering the Nile in the Sudan.

Although there is no doubt that the Carthaginians used African elephants, the question arises whether they might not have had Indian elephants as well. Some authorities have assumed that they did, simply because Polybius referred to the drivers of the Carthaginians' elephants as *indoi*. But this name must be based on the fact that ever since war-elephants were first encountered in Porus's army by Alexander the Great at the battle of the Hydaspes in 326 B.C., Indian trainers and drivers were regarded as the experts. When the Pharaohs began to use African elephants, they imported Indian trainers, and the word *indos* must have come to mean an elephant-driver. The dress of the driver of the elephant on the Carthaginian coins suggests that he was African.

It might be imagined that as India and Carthage were at opposite ends of the known world it would not have been possible for the Carthaginians to obtain Indian elephants, but this is not so. After the death of Alexander the Great his successors became so impressed with the prestige and power conferred by the possession of these new armoured fighting animals that they left no stone unturned to acquire elephants. The Ptolemies managed to get some in repeated wars against the rulers of Syria, and they were all Indian elephants. Ptolemy I probably captured some from Perdiccas in 321 B.C. when the latter invaded Egypt with a force of elephants and was defeated.

Nine years later Ptolemy captured all Demetrius's forty-three elephants at Gaza, and Indian elephants are depicted on a gold stater minted about 300 B.C. In the third Syrian war, which was fought between 246 and 241, Ptolemy III defeated Seleucus and captured more Indian elephants.

During this period the relations between Egypt and Carthage were close and friendly, and it is known that Ptolemy II lent Carthage large sums of money during the first Punic War. It is necessary to believe that Egypt also sent elephants, including Indian elephants, to Carthage, because of the evidence provided by a remarkable coin from Etruria. This coin bears on the obverse an obvious African negro's head, and on the reverse an equally obvious Indian elephant, as may be seen by comparing it with the African.

The Chiana valley of Etruria is far removed from the parts of Italy through which Pyrrhus passed with his Indian elephants in 279 B.C., but it is on the line of Hannibal's march to Lake Trasimene after he had crossed the Alps. It is known from Polybius that after the battle of the Trebbia all Hannibal's elephants died except one on which he himself rode across the Appenines. It is also known from Pliny that Cato, no friend of Carthage, recorded that the elephant which fought most bravely in the Punic Wars was called *Surus*. Surus means "the Syrian", and Syria was where the Ptolemies' Indian elephants came from. It is therefore almost certain, as Sir William Gowers and Dr H. H. Scullard have shown, that Hannibal's elephants included at least one Indian. It is also very possible that Hannibal's surviving elephant, *Surus*, is depicted on the Etrurian coins.

Hokkaido, Japan's Northern Island

by FOSCO MARAINI

Readers of our October 1954 number will remember the article by Signor Maraini on "Tradition and Innovation in Japanese Films". He has spent eight years in Japan and recently returned from a visit to that country. His present article brings out the strange character of Hokkaido, which is situated in the same latitude as central Italy but has a climate resembling that of Finland

North of Japan lies the island of Yezo—let me call it once more by the name one reads on old maps, maps made in times when the new name of Hokkaido, "North Sea Circuit", had not yet become generally known.

In the island of Yezo, during the late thirties of this century, there lived two eminent Victorians. I think most people would agree that Victorians, both eminent and otherwise, were apt to belong to one of two camps which, in retrospect, seem to have been very different and strongly opposed. For want of better general terms we may call these camps the religious and the scientific. Their debates are a matter of history. Three generations or so later—the time-lag is quite natural when one considers the almost immeasurable distance between London and Sapporo—the great spiritual dialogue between the two camps was still taking place in deep earnestness on the shores of Hokkaido.

The Reverend Dr John Batchelor had come to the island as a youth to preach the Gospel to the hairy natives; he had given the Ainu a grammar, a dictionary, a Bible; he had taken down the traditions and lore of their vanishing culture; he had given them hope and aid both spiritual and material; he had finally become their father, and master, and prophet. In fact in these late thirties—he was over eighty then—he looked more and more like Moses, and every gesture, every utterance of the venerable man had a portentously Mosaic character. Dr Batchelor knew exactly the shape of the universe, where Heaven stands and Hell lurks, what's good and bad for man and beast; he often used quite unaffectedly beautiful old expressions like "over yonder hill"; and sat like a patriarch while slowly sipping his tea, in front of admiring guests charmed by his knowledge, by his wit, by his magnificent appearance.

The other cohort of Victorians had its living representative in the person of Dr N. G. Munro. After a life devoted to the medical profession and to the study of archaeology and anthropology, Dr Munro had retired to the Ainu village of Nibutani, in the depths of Hokkaido's forests, to end his days studying on the spot what remained of the vanishing aborigines of Japan. At first sight Dr Munro was certainly not so impressive as his great opponent: he was younger than Dr Batchelor, but his health was rather poor. The fire of a free and inquisitive mind had burnt too vividly in his frame, and the unrelenting battle of independent thinking had worn him cruelly. Yet he kept his mind in constant touch with the latest developments in science and philosophy, both European and American, and his conversation, so human, so rich, so full of fascinating details and memories, was a feast and a treat of the greatest.

I consider it a rare privilege that I managed to be present at one of the few meetings between the two grand old men, in fact their very last one, on a cold and snowy morning in Sapporo, in 1940. We had eaten breakfast at Dr Batchelor's home, where a lively conversation had developed on the subject of Ainu religious belief. One eminent Victorian remarked something about the "anthropomorphic character of the *inau*" (willow sticks with hanging shavings used in many ceremonies) and the other eminent Victorian answered with a guffaw: "Oh those fetishes, you mean! Why can't scientists call things by their names? If you call fetishes anthropomorphs, you'll soon be calling a skull a cranium; as in fact you do, ha ha. . ."

Eventually we walked to the station and saw Dr Batchelor off. It was a very cold day. A cutting wind blew over the Ishikari plains, straight from the frozen north, and there was lots of snow about. Dr Munro thought he would show all the respect due to his elder and more successful colleague and, before the train started, took off his hat. A few seconds elapsed and Dr Munro sneezed. Dr Batchelor then popped his head out of the window looking very concerned, but with a humorous twinkle in his eyes: "Put that cap on your cranium, young boy," he said, "this is no morning for escapades." The train was moving and Dr Batchelor left us with a beaming grin, while Dr Munro sneezed a second time.

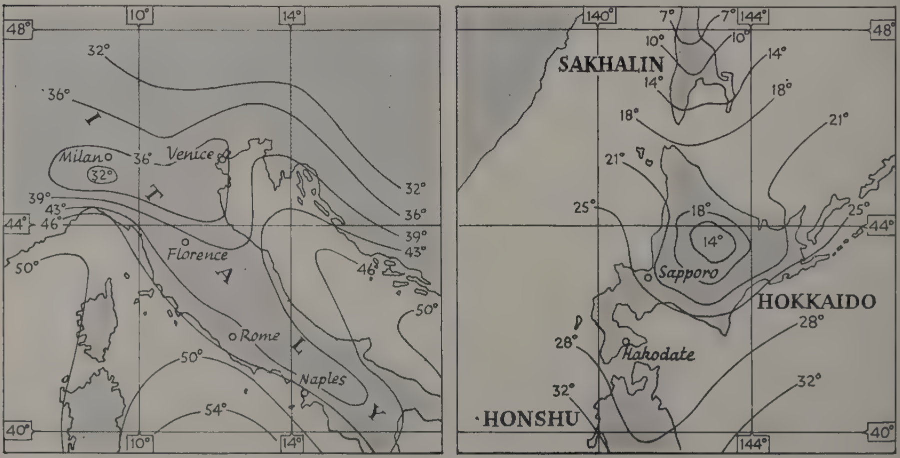
This was all just a few years ago; yet it seems like another world, something that happened in another life. Now the two grand old searchers after truth lie in their graves, Dr Munro in Japan (at Karuizawa) and Dr Batchelor, I think, in England. Both loved Hokkaido, both gave their best energies, the best years of their lives to explore the island and help the natives. It is good to remember them.

Why do so many Europeans and Americans fall under the spell of Hokkaido, of this distant island, with its volcanoes and forests, its blue lakes and stone-age men, its bears and deer, and its long deep snowy winters? I like to think that we find in it something of our distant origins in continental Europe, in ages long past, before roads and civilizations, when forests were forests and storms were storms, when subtle relations of admiration and terror ran between men and bears, bears and men.

The first thing that impresses one, when speaking of Hokkaido, is its abnormally cold winter. Few people realize that Hokkaido lies at the same latitude as sunny, warm central Italy. On this page there is a map with the two regions shown together, with their mean temperatures for January: the difference will strike the reader as extraordinary. Cold currents, the negative influence of monsoon winds (south winds in summer and north winds in winter), the proximity of Siberia, together account for this climatic singularity. Summer is not too dissimilar from summer in other parts of the world at the same latitude, but it is very brief.

The relative inhospitality of Northern Japan and Hokkaido explains quite well the fact that these regions should have remained scarcely populated till recent times. It is well known that the Japanese occupied the islands of their Empire coming up from the south. For centuries these people pushed slowly northwards, mixing with other groups which had invaded the islands from Korea, and eventually uniting to form the Japanese as we know them historically. In the 8th and 9th centuries A.D. the Kwanto region (where Tokyo now lies) was still the "Far West" (really the Far East) of a sophisticated and highly developed civilization, which had its centre in the territory around Nara and Kyoto. A few hardy, savage aborigines, the Ainu, occupied all the unknown world up North. It was only in 802 that the Ainu were finally beaten by Tamura Maro somewhere near the place where Morioka now stands. From then on the migration of Japanese colonizers proceeded regularly, until the very last groups of Ainu were absorbed by the surrounding population, in the lonely peninsulas of Tsugaru and Shikotan, towards the end of the 18th century. Yezo, of course, remained still practically untouched. One authority estimates that around the year 1800 this last island—about the size of Scotland—held only 20,000 Ainu and 30,000 Japanese.

It was during this period that the govern-



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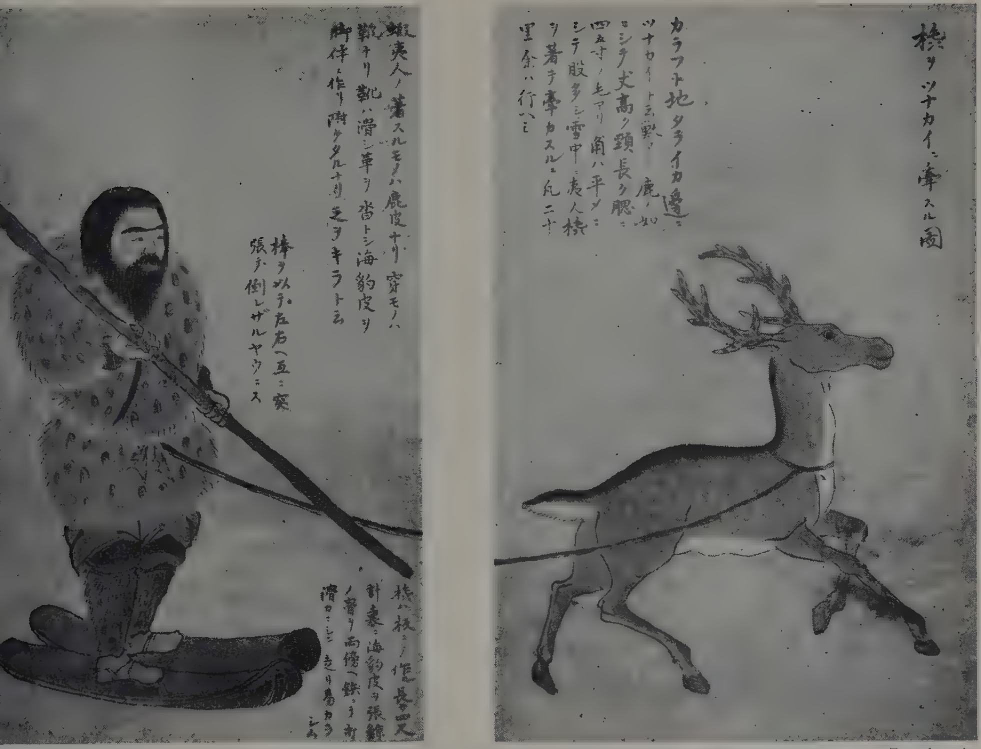
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From the author

An Ainu being pulled by a reindeer, from an 18th-century Japanese book on northern countries. In their long period of self-imposed seclusion the Japanese took great interest in the Ainu, the only foreigners within their territories: people with strange habits who ran on snow and tamed reindeer

ment of the Tokugawa family in Japan (1600-1868) began to take a definite and lively interest in the islands of Yezo and Karafuto (Sakhalin), and in the chain of Chishima, "the thousand islands" (the Kuriles). The Tokugawa regime, since the beginning of the 17th century, had closed Japan to all intercourse with foreign lands; a hundred and fifty years later it still seemed that there could be no danger of intrusions from the Pacific, from the China Sea or from the Japan Sea, but what about those islands, those unknown territories up North? Strange ships were seen quite often roaming along the uninhabited coasts; what would happen if some foreign power should occupy a portion of them, or one or more of the smaller islands? The lord of Matsumae, in the southernmost point of Yezo, nominally ruled the whole territory, but the responsible men in Edo (Tokyo) knew all too well that his power was a myth. Even the Ainu of Yezo were quite independent and governed themselves according to their customary law.

Travellers and explorers were officially encouraged. It was during these years that Hayashi Shihei (1754-1793) wrote his great work *Sangoku Tsuran* about Yezo, Korea and the Loochoos, and Mamiya Rinzo (1781-1845) travelled extensively in Yezo, Karafuto and other northern lands, giving his name to the strait which separates Karafuto from Siberia.

Finally in 1856 the American Commodore Perry forced Japan to open some of her ports, and a series of important events shook Japan to its very foundations. When a youthful, vigorous government emerged around 1870 the scientific exploitation and colonization of all the northern possessions was immediately included in a new policy. Yezo was declared part of Japan proper and its name changed to Hokkaido. In 1869 there were about 58,000 Japanese in Hokkaido; thirteen years later they had become 244,000. In 1870

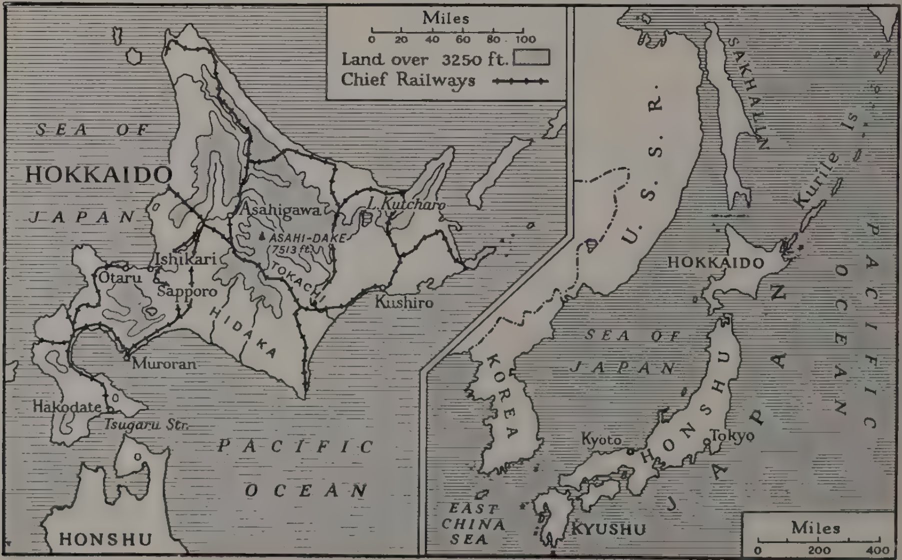
Sapporo, the capital city, was founded, and soon the first railway was built to connect it to the sea. Hokkaido was particularly dear to the reformers of the Meiji era; here was an open new land where experiments could be tried without meeting the heavy opposition of tradition-minded farmers or harming the new trading or industrial enterprises of an aristocracy only recently dispossessed of its powers. Foreign cities could be planned in the approved Western style, houses built after models seen in England or New England. Foreign teachers, experts, technicians were called in from Europe and America. Hokkaido was progressive, full of hope and extraordinary expectations. William Clark, who had founded and most successfully directed the Agricultural School (now University) of Sapporo, ended his farewell speech with words that still ring in the hearts of all Hokkaido students: "Boys, be ambitious".

Now let us look at Hokkaido as it is, eighty years after this brief legendary period. Have the brilliant expectations turned out to be illusions? Is Hokkaido really "the answer to Japan's overpopulation problem", as a recent article in the *Nippon Times* would claim? The latest census gives 4,300,000 inhabitants for the island; a fair number, but one must not forget that Hokkaido is a very large island. The population density is in fact quite low, by far the lowest in Japan, only 56 per square kilometre as compared with 233 for the rest of Japan and 720 for the prefecture of Fukuoka, a typically overpopulated area.

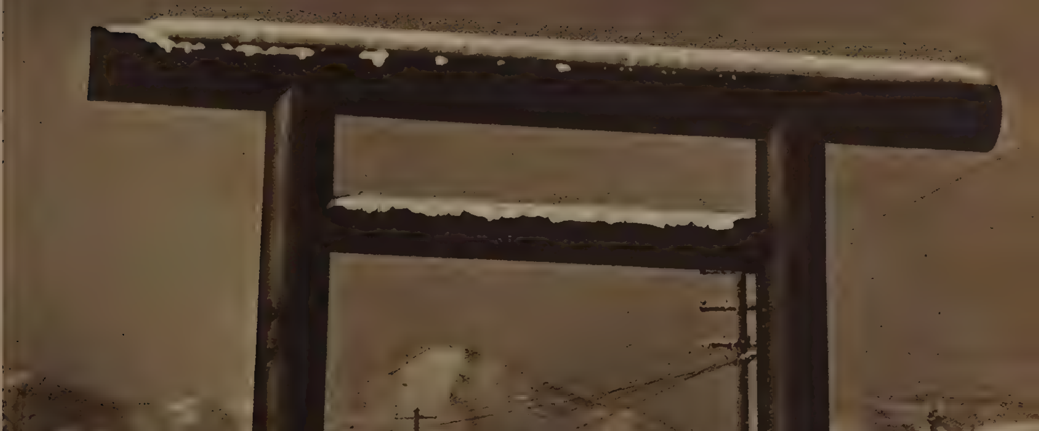
It is true that the lack of quantity has a compensation in the quality of Hokkaido's population. The hard and vigorous climate has been good for the Japanese stock; natural selection has operated cruelly but effectively and, especially in the country, one is often struck by the powerful build, the healthy look of young men and young women.

Probably Hokkaido could support a population nearly double its present one, but the Japanese do not like to go up North, except for temporary periods of migration. Their heart remains always in the South, in the villages where they originally came from. The people of Hokkaido rarely refer to the mainland as Honshu, but nearly always as Naichi, "the inland", a word which emotionally signifies for a Japanese what "home" means to the English. I have met families who have lived in Hokkaido for two or three generations and yet refer to a little village in Nagano-ken or in Fukushima-ken as their "*kuni*", their real country, their homeland.

When living in Hokkaido I was struck by the complete lack of Japanese adaptation to the new and harder surroundings. Hokkaido, they say, has only two seasons, winter and August; yet houses are built, and people are dressed, as if the two seasons were really summer and January. Houses have very large windows, and ridiculous stoves always



K. C. Jordan

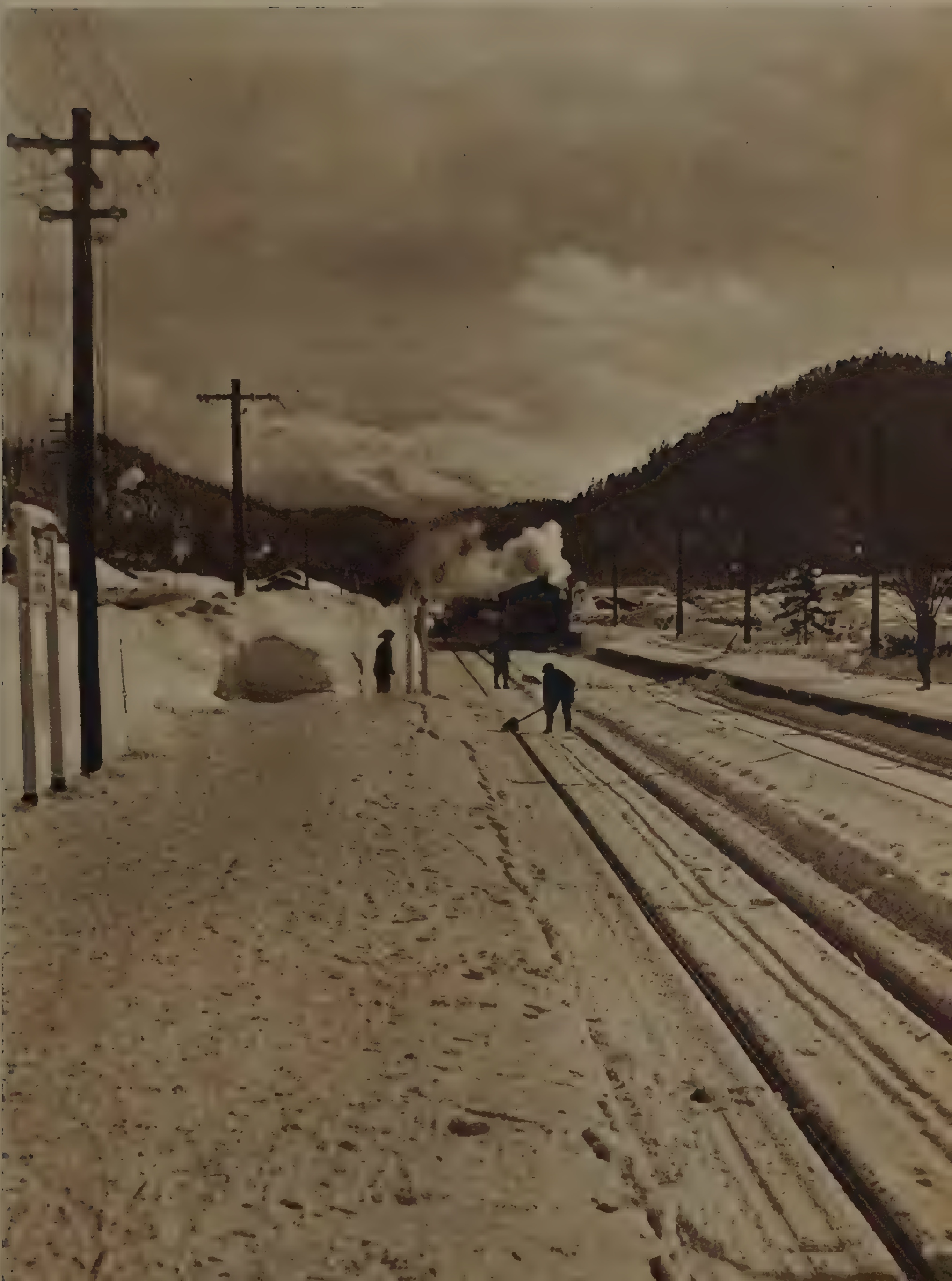


All photographs by the

Everybody is familiar with an exotic South ; Hokkaido, Japan's second largest and most northerly island, has the charm of an exotic North. Though the latitude is that of sunny central Italy the climate is that of Finland. Here three women, in traditional Japanese clothes, pass under the great torii *gate on the way from the main Shinto shrine of Sapporo, the capital*

Stone lanterns of a Shinto shrine in Sapporo which afford a glimpse of the encounter between the climatic conditions of the North and the traditions of a southern culture which the Japanese took with them when they began to develop Hokkaido

A small railway station in central Hokkaido. The Japanese had to overcome great obstacles in opening up their northernmost territory; railways were built, at the very outset of colonization, through the mountains that cut across much of the island

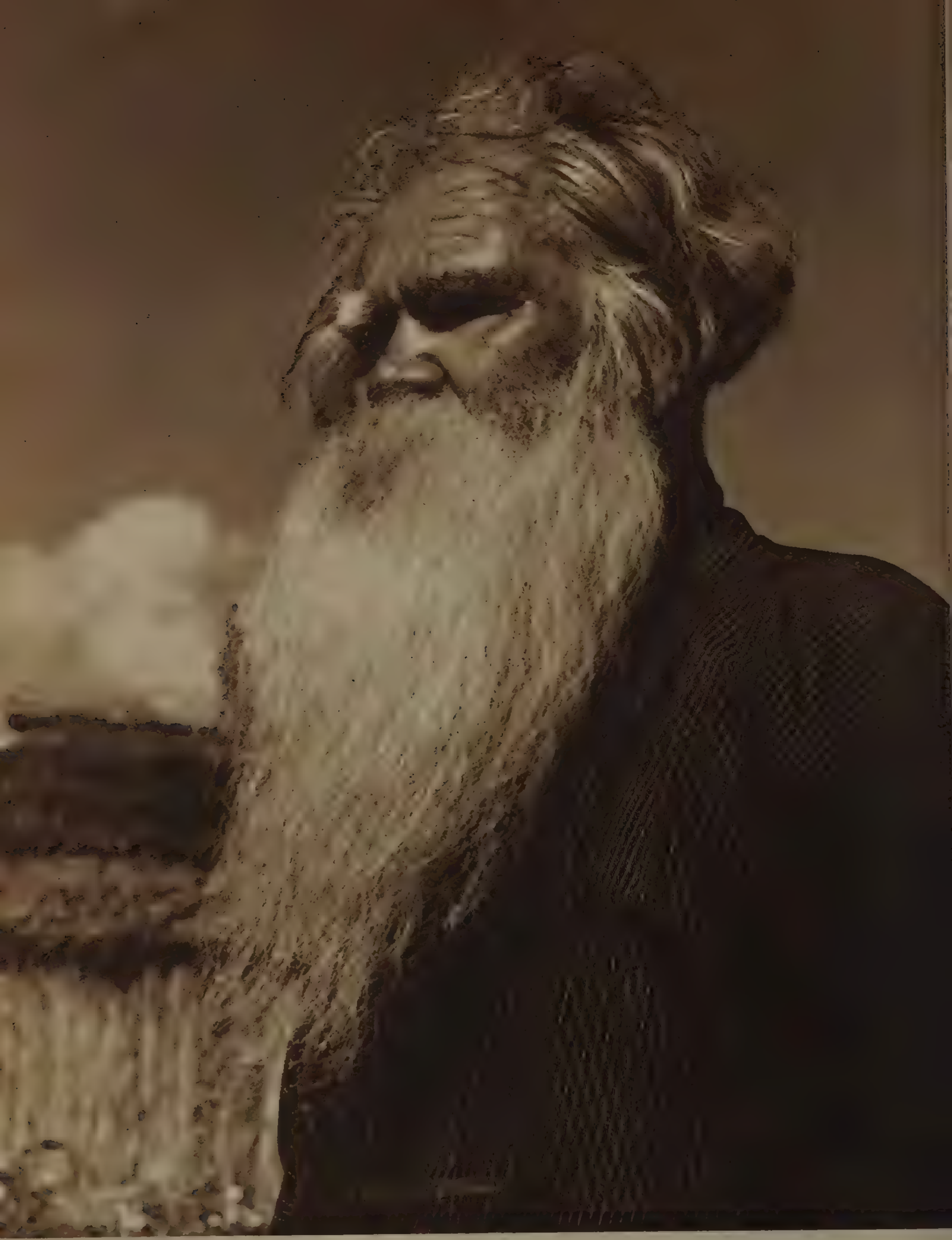


The Japanese cling faithfully to their traditional ways, even in a new environment. Food, clothing and houses in Hokkaido are practically the same as those of Japan proper, where the climate is so much milder. Most people, like these two miserable old women in a snowbound street in Otaru, shiver their way through the long, icy winter. Hence the reluctance to migrate to Hokkaido although it is the least densely populated part of Japan

Hokkaido has a long sub-arctic winter but the summer is warm and moist; vegetation is thus very luxuriant, and timber (with coal and fishing) constitutes one of its principal industries. Much of the original forest has been cut but vast reserves remain: according to a recent survey two-thirds of the island's surface is still covered with forests. Sledges loaded with tree-trunks in the Daisetsusan Mountains in central Hokkaido

The mountains of central Hokkaido have a noble simplicity that gives them great beauty. The highest of them, 7513-foot Asahi-dake, the "morning sun peak", is a volcano with some slight signs of activity. The climb from the foot of the terminal cone (here seen) to the summit takes about an hour

A lone skier approaching the Hyamizu ("freshwater") Hut, near Sapporo-dake (4245 feet). There are many huts where one can eat or spend the night in the fascinating mountains south of Sapporo, which with their steep valleys and primordial fir forests are specially suitable for cross-country skiing



An Ainu elder (ekashi). *The Ainu, a primitive branch of the white race, are physically different from their Japanese neighbours; they are also the hairiest people on earth, the great beards of the ekashi being a venerable sign of perfect manhood. They are nearly extinct: only very few of pure blood remain* on the verge of collapsing; men and women go about their work in the depth of winter dressed in makeshift cloaks or covered with blankets, as if the freezing air were an unpleasant condition of things that will pass in a few days. Many shops and offices are furnished with great fans for the twenty days of stuffiness in August, but have the most inefficient heating for the eight or nine months of real cold.

Food is also most inadequate. You can buy a *bento* (picnic lunch) in a railway station in Hokkaido, in full winter, in a snowstorm which has lasted three days with a temperature of 0° Fahrenheit, and it will contain boiled rice, slices of salted fish, some pickled radish (*takwan*) and various bits of vegetable or fish boiled in soy (*tsukudani*), just as it would in Kyushu or Kwansai, where winters are brief and most of the year is hot. I have often been out in the mountains of Hokkaido for days on end with students of Hokkaido University during skiing expeditions and all I have seen the boys eat was rice balls (*nigirimeshi*), bean curd (*miso*) or sweet bean paste (*yokan*) as a treat. The Japanese consider this most admirable (thrift, hardy asceticism), but everything has its limits: the result, in Hokkaido, is that the weak die (mostly of tuberculosis) and next to a race of athletes there is also a sad race of miserable human weeds fighting to survive.

Japanese governments, since 1867, have launched plans to attract settlers; even today a prospective colonizer can buy land on most convenient conditions and get started with favourable loans. Yet what is needed is not so much material inducement to overcome physical difficulties, as something like spiritual digestion of these new and foreign surroundings. Let us look at the problem through Japanese eyes and perhaps it will be easier to understand. The Japanese, like the French, feel that life is only worth living if it means a full enjoyment of the fruits of their ancient and exquisite civilization. Such fruits are represented both by temples, gardens, cherry-blossoms in spring, *momiji* leaves in autumn, and by urban life with its theatres, *geishas*, parties, its choice *sake* (rice wine), delicious *sashimi* (fresh fish), savoury *unagi* (broiled eels) or *tempura* (fried prawns). Going to live in Hokkaido means saying good-bye to most of the things that a real Japanese cherishes. The landscape in itself is alien: the mountains are too large and too barren, the forests too deep, there are no ancient temples, or gardens, or shrines with historical associations to give you a sense of man-made beauty, the cities are raw and rough, frontier encampments, and the pleasures offered to the muscular wood-cutters are bawdy and barbaric.

Most probably if a poet of national fame sang for a generation the winter snows on Mount Tokachi, the return of spring in the larch-woods of Maruyama, the summer dances in an Ainu village, the autumn leaves at Sounkyo gorge, his humble work might have a greater success, in the long run, than all the inducements that perplexed ministers can offer their citizens. Hokkaido has been declared a part of the Japanese mainland, but it has not yet been really absorbed into the Japanese soul.

Hokkaido has many important natural resources: coal, forests, minerals and especially fisheries. Yet it is only recently that people have realized the great treasures that Hokkaido possesses as a centre of tourist attraction, both in winter and summer.

Summer is cooler than in central or southern Japan. Summer is the season to visit the deep blue lakes, to climb the strange volcanoes with barren violet rocks, where whistling steam gushes from yellow precipices, to get lost in the primaeval forests of Tokachi, to rest in the hot springs of Noboribetsu; it is also the season to go fishing or swimming along the cliffs of Muroran, or from the sands of Shiraoi, to look for the last Ainu villages up the Saru valley or along Kutcharo Lake.

In winter the whole of Hokkaido becomes one vast skiing paradise. In the mountains of Niseko or the hills of Sapporo you can go across the country from one hut to the other, often with downhill runs of two or three thousand feet, ending the day in the hot water of a natural spring with its reinvigorating sulphur fumes. In the further and higher groups of Daisetsusan or Tokachi climbs are longer and downhill runs steeper, the landscape is more definitely a mountain one. If the local authorities encouraged some company to build a few ski-lifts (Mt Moiwa, near Sapporo, would be an excellent place) a visit to Japan might become even more popular than it is now.

To end our survey of Hokkaido let us take a last look at the Ainu. Many anthropologists agree that these hairy people belong to a very primitive branch of the white race; their features are completely different from those of the populations among whom they live. In ancient times they occupied most of Japan (Fuji is an Ainu name, Fuchi Kamui being the Ainu goddess of fire, a particularly appropriate name for a volcano). Nowadays only a few Ainu remain in Hokkaido and Sakhalin. Estimates vary as to their number.

The author

The hill of Maruyama, only two miles from Sapporo, is a favourite playground for skiers. Skiing has become very popular in Hokkaido, where the 1940 winter Olympic Games were to have taken place

Probably there were never many more than 50-60,000. Today it is very difficult to find out how many survive as there is no legal distinction between the Ainu and the rest of the population of Hokkaido. Intermarriage with the Japanese has been going on very actively for the last three generations and, as a personal estimate, I would say that somewhat less than a thousand pure Ainu still remain scattered in various parts of the island; most of them are old and in a dozen years or so will have returned to the lands of the Kamui (the Ainu gods). If today one can speak of the Ainu as vanishing, in a generation they will be as extinct as the dodo, at least from the point of view of physical anthropology.

From the cultural point of view their extinction is practically a fact today. Only some of the very oldest men and women speak (badly) their original language. A brilliant young linguist, Mr M. Chiri, a pupil of the well known scholar K. Kindaichi, has recently had great difficulty in securing for science an ample documentation of the Ainu language and oral literature; only three or four *ekashi* (elders) being still capable of giving reliable information. I have noticed very great changes when visiting Ainu communities in 1938 and in 1954. Sixteen years' difference had meant, among other things, the disappearance of nearly all the material 'treasures' that were once kept in the huts: ancient Japanese lacquer vessels or swords, beautiful embroidered gowns (*atushi*), moustache-lifters and other ceremonial objects.

From an anthropological point of view it may be very sad to see the end of this race of legendary men with their great beards, and of graceful women whose deep black eyes seem to express the strange melancholy which is called by the Welsh *hiraeth*: but let us look at the Ainu as human beings, let us think of their welfare. It is only by becoming completely absorbed into the surrounding Japanese population that they will find a new dignity and look confidently to life. Fortunately there is little racial feeling on the side of the Japanese: this is a sound basis on which to build the future of Hokkaido.

The Lives of the Seals

by R. M. LOCKLEY

Mr Lockley is internationally known for his studies of sea birds and seals. His books include The Seals and the Curragh (*1954*), I Know an Island *and* Letters from Skokholm. *After drawing a broad picture of the distribution and present numbers of the main species of seals, he gives fascinating details of the results of recent scientific investigation into their life-history*

THE seals of the world today are claiming man's special attention for several cogent reasons. First, because of the improvement in sea and air transport which is making more accessible their Arctic and Antarctic breeding-grounds. Secondly, because seals represent a potentially rich source of protein, oil, hide and fur in a world ever hungry for these commodities. And lastly because there is a growing interest, both commercial and sentimental, in their preservation.

The seal group (known to science as the *Pinnipedia*) include the true seals (*Phocidae*), the sea-lions (*Otariidae*), and the walrus (*Odobenidae*). The true seals have minute concealed ears; their short limbs make progress on land clumsy, a hunching of the body, slug or caterpillar fashion. The sea-lions have distinct ears; their arms are long and their legs much more flexible, better adapted for scrambling and climbing on land. The ponderous walrus with its ivory tusks is too well known to require description—it survives today only in the high Arctic. Its appetite for shellfish, so delicately rhymed in *Alice in Wonderland*, is in fact a real one—it lives largely on clams and other crustaceans dug from the sea-floor with those great tusks.

The majority of the pinnipeds are marine; but they do not normally go down into deep water. They live at or near the surface, frequently hauling ashore to rest on land or ice-floe, where they normally deposit their young. They are found in most latitudes, even at the Equator (e.g. the Galapagos Islands in the Pacific), but are most abundant in cold and polar regions. Their distribution in low latitudes seems to coincide fairly closely with the direction of polar or cold currents, which, for example, may have drifted some of the sea-lions and fur seals to their present stations along the Pacific coast of tropical America.

Those seals whose skins were valuable for the fur trade suffered severely during the opening of the seas to navigators in the 18th and early 19th centuries. Thus the Juan Fernandez fur seal (*Arctocephalus philippi*) was slaughtered in thousands and is probably now extinct.

The closely related southern fur seal (*Arctocephalus australis*) was so vigorously hunted that by 1823 it was nearly exterminated (112,000 skins were taken in 1800 in the Antarctic islands of South Orkneys, South Shetlands and South Georgia). Under protection it has slowly recovered—about 1,000 may exist in South Georgia today, but there is a strong colony of some 20,000 in the Falkland Islands.

In the North Pacific the tale of the northern fur seal (*Callorhinus alascanus*) is one of severe persecution and successful recovery. In 1786 the Russian fur-trader Pribilov discovered a herd of 2,500,000 fur seals on the islands off Alaska which are named after him. By 1911 these were reduced to 500,000 by intensive killing. Since then, under the model conservation of the United States Wildlife Service, this herd has recovered and today may be 2,000,000, from which some 60,000 (chiefly surplus male) skins are taken annually.

In the Antarctic the elephant seal (*Mirounga leonina*) was discovered by Anson in 1744, and subsequently severely exploited by American sealers. It is now controlled in certain of its breeding-grounds, where the females are totally protected, and is slowly building up its scattered colonies.

The truly Antarctic seals, which live beside the remote barrier- and floe-ice, are at present fairly safe. Thus the crab-eating seal (*Lobodon carcinophaga*), living around the drifting pack-ice, is one of the most abundant seals in the world. Little is known about it: it may be over a million strong. It is freely hunted and devoured by the killer whale.

The Weddell seal (*Leptonychotes weddelli*) is another ice-breeding species present in large numbers in the Antarctic. Most 'south-polar' of all is the Antarctic seal (*Ommatophoca rossi*) named after the explorer Ross. It has rarely been seen by man and may not be numerous. The carnivorous leopard seal (*Hydrurga leptonyx*), renowned for its appetite for penguins, lives on the fringe of the pack-ice, and for that reason is not in danger of extinction. It is a solitary species.

V. B. Scheffer, by courtesy of the U.S. Fish and Wildlife Service

(Above) *Alaska fur seals, part of a herd of about 2,000,000 in the Pribilov Islands, where they are now protected by the United States Wildlife Service. About 60,000 surplus males are killed annually for their fur.* (Below) *A mature bull fur seal with six cows of his harem and some of their calves*

V. B. Scheffer, by courtesy of the U.S. Fish and Wildlife Service

Polar Photos

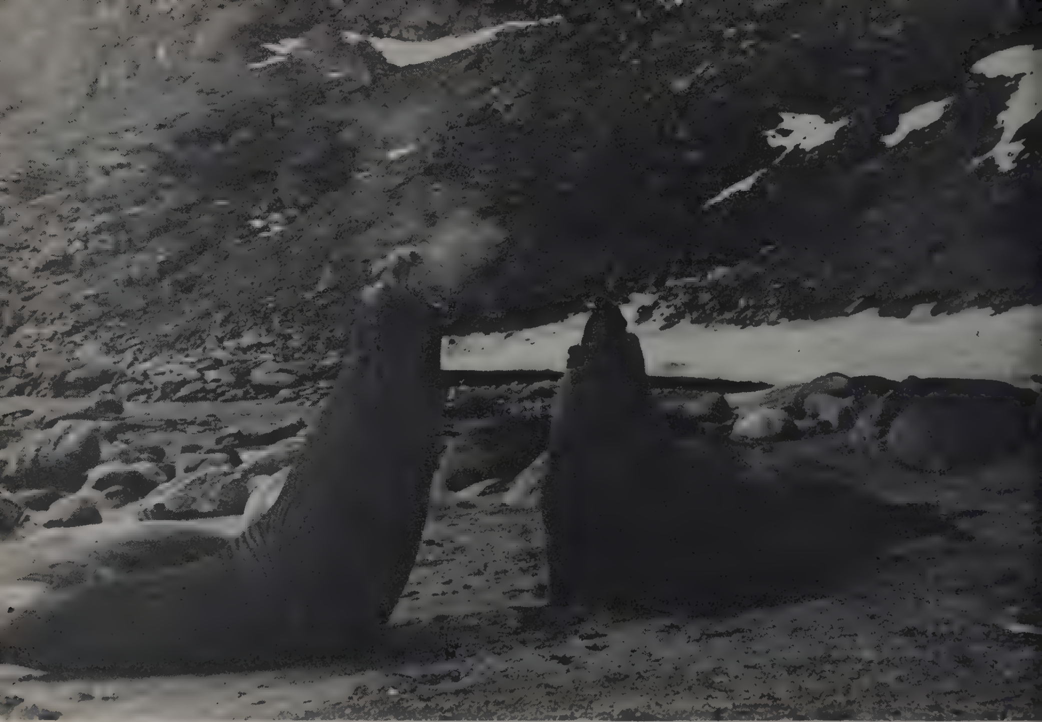
Baby Alaska fur seals in the Pribilov Islands. As with other seals, the calf or pup is suckled with highly nutritive milk for a short period of under one month. Soon after it is weaned, having completed its first moult, the calf becomes completely independent and swims out to sea alone

In the North Atlantic the figures for the slaughter of the gregarious harp and hooded seals, which breed in vast herds along the edge of the drift-ice from Newfoundland to the White Sea, may run into a million skins in a single summer. In 1951, for instance, Canadian and Norwegian ships took 346,000 harp and 143,400 hooded seals; in the same season Russian ships were known to have taken many thousands in the Barents-White Sea area.

The harp seal (*Phoca groenlandica*) is small, adults measuring between 4½ and 5½ feet in length. The calf is born on the drift-ice in spring with a white woolly coat (lined with blubber) which is the main attraction to the seal-fisher, who endeavours to take it before the moult, which begins when the cow finally deserts the calf at two weeks old. The baby calf is clubbed and immediately skinned and the unwanted carcase may be left on the ice—to be discovered later by the nursing mother. The harp-seal cow is shy and seldom defends her young: she slips into the sea when the seal-fisher approaches. If she stays, however, she is also killed for the sake of her skin. Horrific scenes of this inhumane slaughter were shown on a film to the conference of the International Union for the Protection of Nature at Copenhagen in September 1954, when resolutions were passed demanding adequate international protection for all the large Polar mammals.

The hooded seal (*Cystophora cristata*) is a larger species, the male (which alone has an inflatable 'hood' or air-sac above the nostrils) measures between seven and eight feet, is powerful and aggressive when approached, and can move speedily over the ice in defence of his wife and young. This trait exposes him to the ready gun of the sealer, and in fact hooded seals are rapidly becoming scarce in the Arctic.

The ringed seal (*Phoca hispida*), about the size of the harp seal, has an interesting Arctic distribution, being a coastal species and rather solitary. Its non-migratory habit may have led to its present division into subspecies in the several relict populations inhabiting inland seas such as the Caspian, Lake Ladoga and Lake Baikal. It is taken by sealers, especially in the Baltic and the White Sea, where the white woolly calf is born on the ice in spring. It is also occasionally taken by



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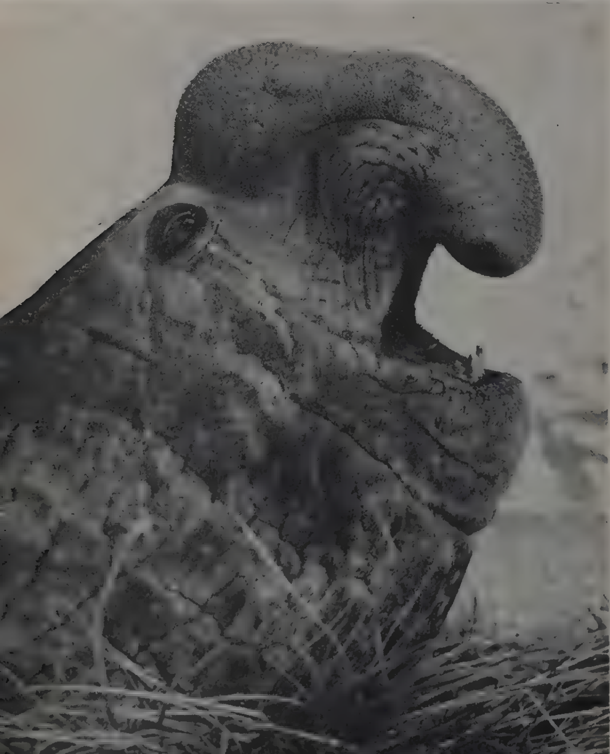

Alfred Saunders

(Above) *A fight between two mature bu*
elephant seals in the South Orkney Island
These bulls are as much as twenty feet i
length and may weigh five tons. Each tri
to gather a harem of up to 100 cows, whic
he defends by rearing up and roaring at th
other bulls. (Left) *The inward-curvin*
nostrils act as a resonating chamber or ampl
fier for the snoring roar of air ejecte
from the lungs by the excited and outrage
bull ; only bulls have the large muscular nos
(Opposite, top) *Cow elephant seals squabb*
when neighbours come too close to the blac
curly-coated calf, which is born in th
harem and trebles its weight (reaching fo
hundredweight) in three weeks. At this tim
mating occurs and the calf, moulting into
silver-grey coat, begins to look after itsel
(Opposite, bottom) *Highly sociable ex*
cept in the mating and calving season, ele
phant seals crowd together peaceably at moul
ing time, when they fast and sleep, rubbin
the old coat away against their neighbours a
they lie in wet hollows on land, as in th
scene on Signy Island in the South Orkney

sealers in the Gulf of St Lawrence.

Monk seals (*Monachus*) have been exterminated in their West Indies and Florida haunts during the last century; but some survive, badly in need of protection, in the Mediterranean and on the north-west African coast.

Only two species of the true seals live permanently in British waters. The Atlantic or grey seal (*Halichoerus grypus*) favours the rocky shores and deep water of the Atlantic side; and the harbour, common or sand seal (*Phoca vitulina*) is most numerous off the shallow sandy coasts of the east side of the British Isles. The breeding-grounds of both species extend from eastern Canada to the Baltic. Because of alleged damage to salmon and other fisheries, the common seal is totally unprotected and frequently there is a price on its head. In Canada a bounty is paid for every lower jaw of this seal, the peculiar structure of its teeth (to which I shall refer later) being one of the best methods of reliable identification.

The rapid decline in numbers of grey, common and ringed seals in the Baltic Sea is shown in figures supplied by the Swedish and Finnish authorities from the returns of the seal-fishers, who take them on the ice in winter and by boat in summer. Only in the British Isles and Norway is the grey seal protected by a close season. In the British Isles this extends from September 1 to December 31, and it has resulted in an increase of these seals: probably more than half the world population of at most 40,000 now reside in British waters.

This is an encouraging example, but among maritime nations there is still great need for a general internal movement towards preserving those seals of the coasts which do not seriously affect the interests of the fisheries (and there is little scientific proof that in general seals do so). Nor is there any permanent international agreement restricting the hunting of pelagic seals on the high seas, as there is for whales. Such a convention is much overdue, and ought to be brought about before stocks of some species fall any lower. At the same time more humane methods of killing seals should be agreed and enforced and more research carried out.

The general picture of the life-history of the seals which is emerging from recent studies of certain species, illuminates what was hitherto dark and full of error, superstition and myth. In Norway the seals were traditionally believed to be spell-bound human beings; they were the children (and their issue) of King Lochlann, by witchcraft

A Weddell seal contemplates the cold waters of the Antarctic Sea. Rarely seen by man, this seal thrives in great numbers in its stormy and inaccessible habitat on the edge of the South Polar ice

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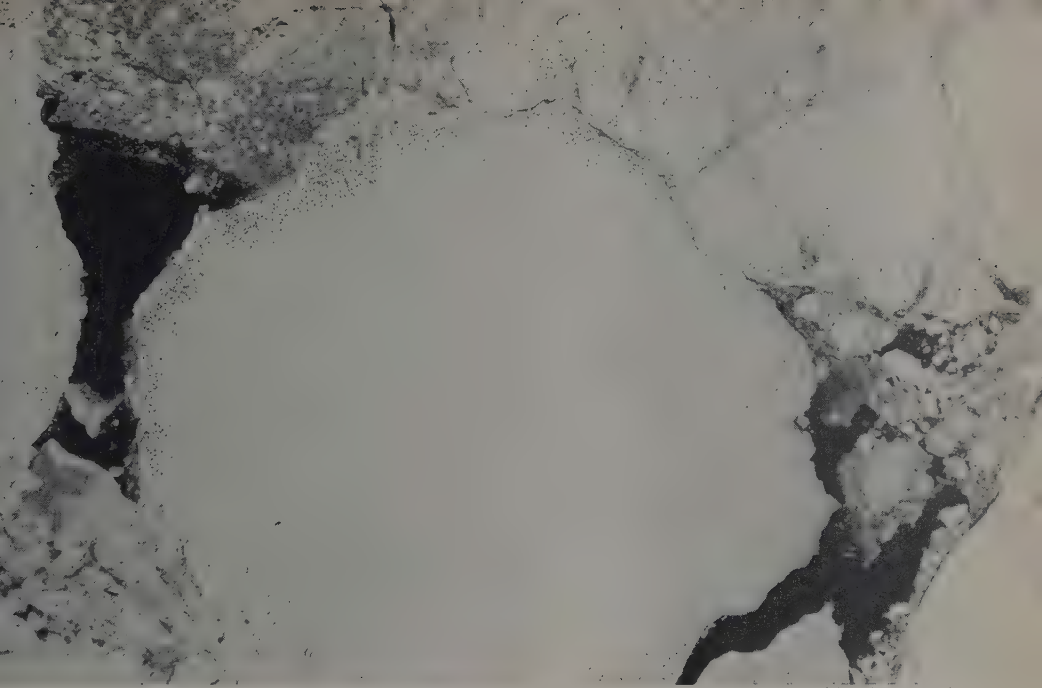
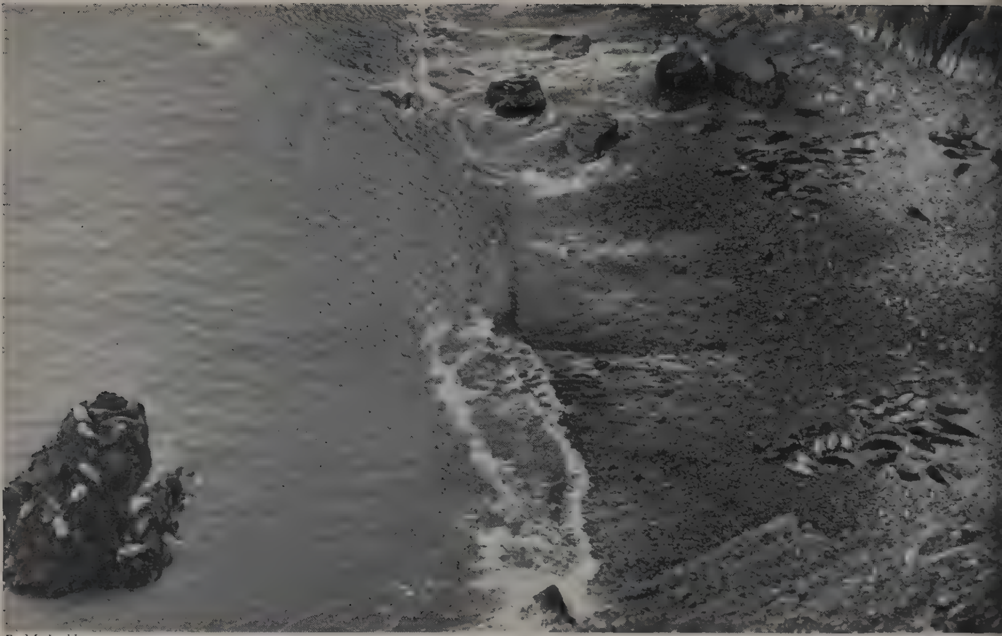


By courtesy of the Fisheries Research Board of Cana

(Above) *Adult harp seals climb up cracks in the ice onto floes in the Gulf of St Lawrence, before the birth of the single white calf. These large "whelping parties" of cows are attacked by seal-fishers for the calves' fur.* (Below) *A cow harp seal with its calf, before the adult markings have been formed*

By courtesy of the Fisheries Research Board of Cana



R. M. Lockley

Spring assemblies of British seals seen in their respective habitats. (Above) *Looking down from the cliffs of the west coast at groups of Atlantic grey seals asleep on rock and beach, or playing in the sea.* (Below) *An aerial photograph of common or sand seals on a sandbank on the East Coast*

Aerofilms Ltd.

turned into half-human half-fish form by a jealous stepmother. Each year at the harvest moon they were allowed to regain human form and come ashore to enjoy for a brief period at night their lost human estate. The autumnal wailings of the seals at their breeding-grounds resemble the cries of human beings under duress, and may have given rise to these and similar stories current also in Wales, Western Ireland and the Hebrides.

From entertaining fiction we turn to even more fascinating fact which recent scientific investigation has brought to light especially regarding the breeding biology of seals. It is now known, for instance, that although seals mate soon after the birth of the calf, and thus have an apparent gestation period of nearly a year, the fertilized ovum does not develop immediately but remains unattached in the uterus or womb. For several months, perhaps for one-third of the year, it exists in the form of a free cyst (the blastocyst) less than a centimetre in diameter. About seven months before parturition the blastocyst swells and implants and the true gestation period of about thirty weeks begins.

This delayed implantation may well be found to apply to all the seals, and although at first sight it may seem inexplicable, it can be explained as part of a useful biological device. In wandering species like the seals the only moment when the female is obliged to be stationary and therefore indubitably accessible to the male is when she is nursing her calf on or close to the shore or the ice. At other times she is roaming and free. It is always the finest, most dominant and potent bulls which secure as territory the nursery beaches, and patrol these during the period when the calves are being suckled. They are thus on hand to impregnate the cows as soon as these are ready to mate, about a fortnight after the birth of the calf. Thus the whole business of breeding is disposed of in the few weeks when the seals are ashore—a great advantage in a marine animal.

It is not altogether surprising that the fertilized egg at first remains quiescent in the mother: at the moment of impregnation she is feeding her calf with the richest of milk (about 50 per cent fat) but fasting herself, and she loses in the process something like one-third of her body-weight. She could hardly nourish a normally developing embryo at the same time. After the short lactation period is over, she leaves her calf and is in even poorer condition as she enters the next phase in the annual cycle—the moult. Only when this is complete and she has recovered much of her lost weight is her body fit to nourish a growing foetus, and it is at this moment that the minute embryo begins to develop.

Delayed implantation is now known to occur in several roving land mammals also, such as the roe-deer, bear, badger, armadillo, stoat and weasel, and probably for similar biological reasons.

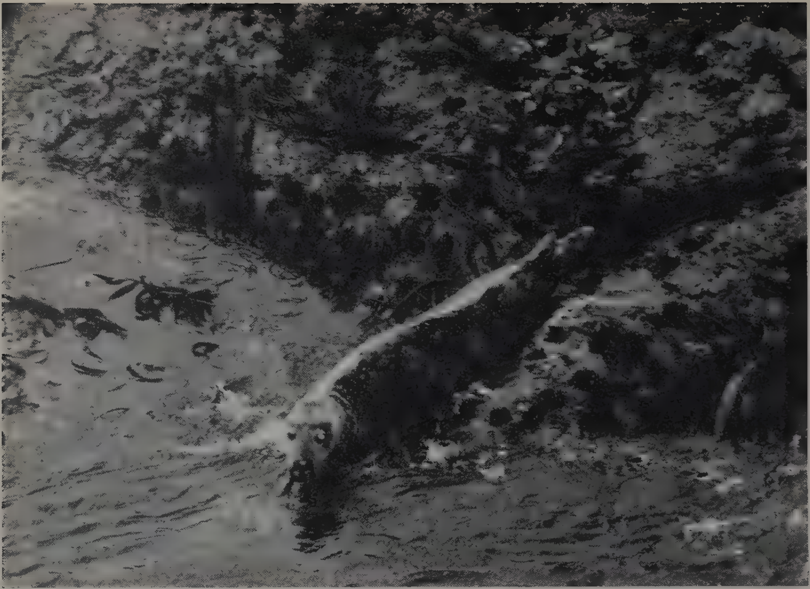
After the breeding-season the adult seals usually scatter in small bands to moult, sometimes with the sexes segregated. Elephant seals form dense moulting parties, lying on top of each other in 'wallows' of wet ground. During the moult, as in the short breeding-season of less than a month, some species of seals fast. For about eight months of the year the seals live free, swimming widely over their normal range, feeding and laying on a thick coat of blubber in preparation for another breeding-season. They may be solitary at this time, though usually not for long. Most of them remain gregarious in larger or smaller herds.

In most seals there is a renewed activity of assembly and mating (or pseudo-mating) after the moult. Both British species, the grey and the common seal, assemble in the spring about the time of the delayed implantation of the blastocyst. It is now considered likely that fertilization also occurs then, of those, perhaps late-calving, females which have failed to conceive in the autumn and also of those virgins which at that moment of robust health come into breeding condition for the first time. If so, there may be no delay in the implantation and development of the embryo.

The spring assemblies of these two British seals are most spectacular, being full of activity, of playfulness and of both true and erotic mating. It is even possible that the second mating of an already pregnant female, if it takes place, may have some significance in the sudden activity of the hitherto dormant blastocyst—it has been conjectured that the highly nutritive surplus sperm may be used as part of the pabulum needed by the minute embryo in its new activity.

In these spring assemblies, as the cows have no calves, the bulls cannot dominate a nursery territory. In fact it is noticeable that the cows appear to make the sexual advances at this season, by pursuing the bulls and indulging in endless water-dances, which are striking and graceful to the human watcher on the cliff-top.

Seals breed at an early age. For instance the young common, grey, elephant and fur seal females mate at the end of their second or third years; their precocity in this way resembles



R. M. Lockley

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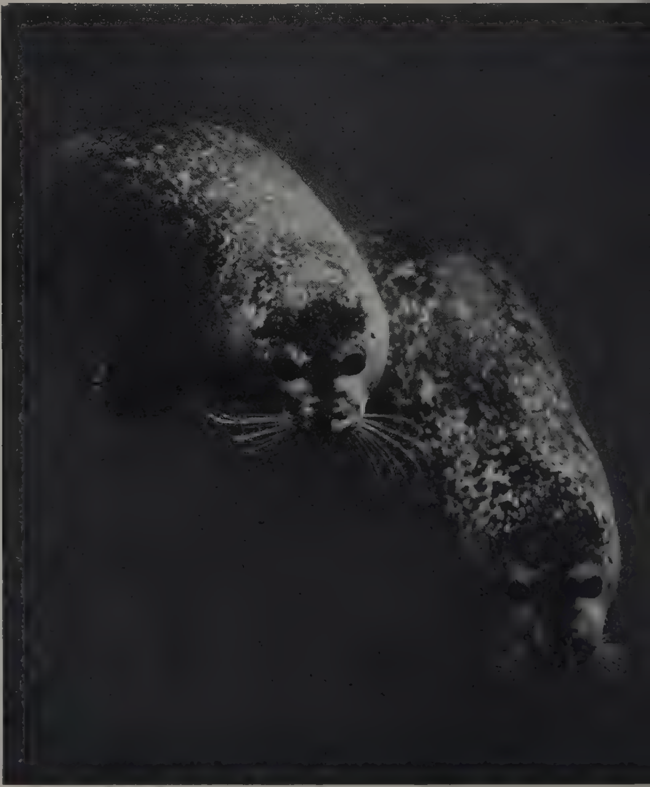
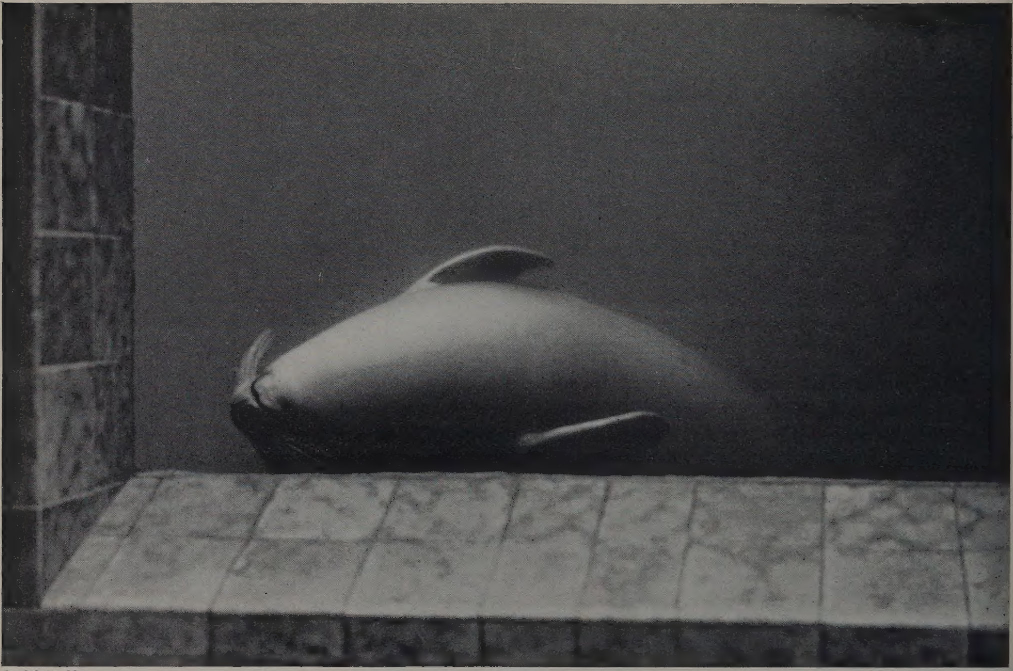


(Above) *The long hound-like features of the grey seal distinguish it from the other British seal, the sand or common species, seen* (right) *swimming under water. Smaller than the grey seal, these differ also in their more dished face and catlike nostrils, and in their ability to swim immediately after birth, unique among seals*

(Left) *A cow grey seal suckles its white-coated new-born calf on a secluded Welsh beach. The cow, fasting during the short lactation period, loses weight at an average rate of six pounds a day or twice the amount that the calf gains.* (Below) *Replete, the calf sleeps heavily. Weaning takes place when the pups are two to three weeks old*

Vallis Power

R. M. Lockley



R. M. Lockley

A common or sand seal asleep under water in an aquarium. The lungs are almost empty of air and it is able to remain below for about ten minutes, periodically rising to the surface to take about ten deep breaths while still apparently asleep. Like dogs, seals twitch and quiver in their dreams

that of domestic cattle. Young grey, elephant or fur seal bulls may not secure cows, however, until they are four or five years old, owing to the harem system by which each mature bull reserves part of a nursery breeding-beach with its complement of cows to himself for as long as he is physically fit and able to drive away young suitors. But as he fasts during this period he gradually weakens and in a single breeding-season a nursery territory with its procession of calving cow-seals may be dominated by one or more master bulls in turn.

It is observed that the larger the male of a seal species is, in proportion to the female, the more polygamous is that species. Mature bull elephant seals may weigh up to five tons and measure twenty feet long—they, like the fur seal bull above five years old, have large harems of up to one hundred cows. Strict monogamy in seals may be rare, but is believed to exist in certain species, notably the bearded seal of the Arctic.

The senses of seals are specially interesting. Long sight is poor: provided the observer moves upwind upon a seal herd, crawling slowly, prone in neutral clothing, seals allow a close approach, so unsuspicious are they of the horizontal figure which they evidently mistake for one of themselves. But if your scent travels to them or you stand upright, silhouetted against sea or sky, the whole herd may panic seawards.

The large eye of the seal is better adapted for short focus under water. The pupil is small, the iris transparent with the sensitive blood-vessels clearly visible within. As a seal grows old it may become blind, with age or by disease or in fighting. Even so it seems able to find enough food to live; the stiff whiskers or *vibrissae* have sensitive roots connected by nerves to the brain and must be useful as guides in the darkness of deep water and caves.

The ear is usually very small, and is automatically closed under the water by muscular action: hearing is good but not acute.

Seals do not depend upon sight for revealing the whereabouts of their neighbours. If a cow cannot see her calf she may call to it in her musical moaning voice. The calf may mew in reply, but the final recognition is by scent; each calf has its own identifiable smell and its dam cannot be deceived if the human observer tries the experiment of substituting an otherwise identical calf for the legitimate child—the cow will reject the stranger with snarls and bites.

Their adaptation to living aquatically has reached the stage of being able to sleep under water. When a seal dives most of the air is expelled from the lungs (otherwise it would be buoyant) and for perhaps ten minutes or so it need not breathe air again. During this period below the surface the metabolism slows down, the heart-beat is reduced from about 150 to 10 a minute so that the rate of blood-flow is also reduced, and its oxygen content falls from the normal of about 20 per cent to as low as 2 per cent. As the carbon dioxide content of the blood rises, the desire to breathe compels the seal to float to the surface. Often when asleep under the water it does this subconsciously, not opening its eyes at the surface but merely taking a dozen deep breaths to refuel its system with oxygen, and sink gently under once more. The process resembles the unconscious movement of a man turning over in bed.

More research on the underwater life of the seal may reveal that the long idle periods of basking on sandbanks, rocks and ice formations are really essential as an aid to digestion after meals, since it is probable that the digestive process is retarded when the metabolism is slowed down under the water. Curiously enough muscular action under water seems not to be affected by this change in the heart-beat—seals can move at great speed under the water, in chase of fish as well as, sportively, in pursuit of each other. There may be some counteracting mechanism not yet discovered beneath that thick coat of blubber which so completely protects the healthy seal from cold. Perhaps rest above the surface is principally necessary after meals when, with the heart beating fast and breathing normal, digestion is rapid; and sleep beneath the water is indulged in during fasts. Nursing grey seal cows, I have

Members of the West Wales Field Society clip a London Zoo ring over the inner hind toe of a grey seal calf about a week old. Seals ringed on the Welsh coast have been recovered in Brittany, Cornwall and Southern Ireland; others ringed on the Farne Islands have crossed to Norway and Germany

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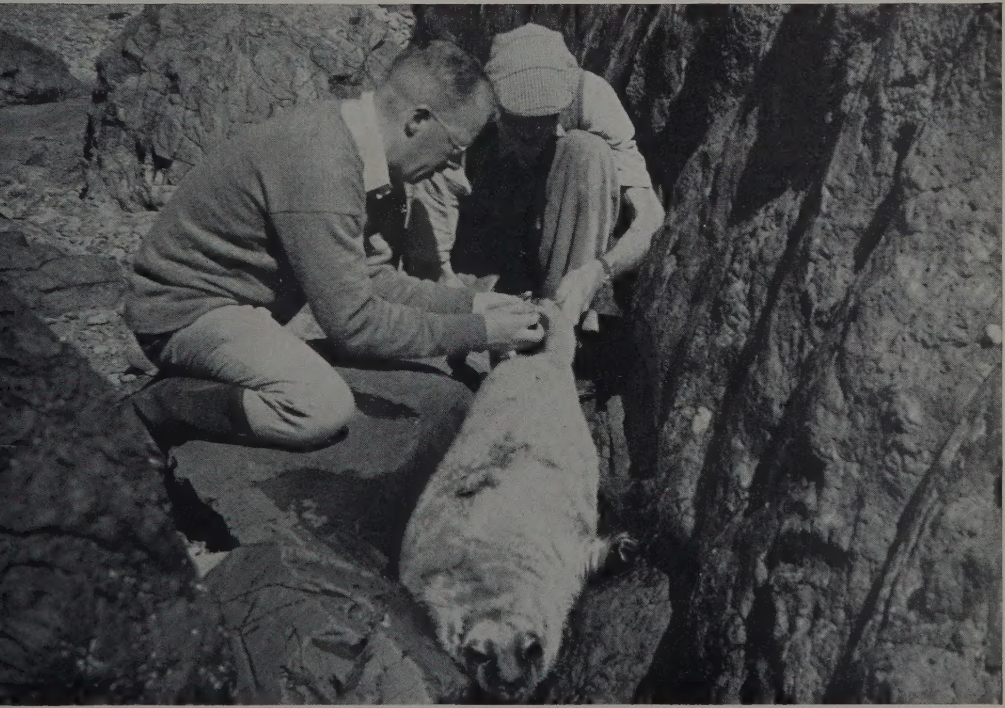

observed, sleep much under the water; by so doing, with the heart at its minimum beat, they may be conserving their strength during this fasting period of their lives.

I have mentioned the distribution of the two British species, the grey seal being greatly predominant on our western and the common seal on our eastern coasts. This division of territory is associated with different habits and food, each having its special niche in the marine ecology. As a result, where they overlap in range there seems to be no conflict or competition: you may often see both basking peacefully together on the same reef.

Food differences are indicated by structure of the teeth. The molar teeth of the common seal are provided with cusps which evidently assist in crushing the cockles, whelks and other shell-fish which have been found in its stomach: it also eats flat-fish and is accused of taking salmon. The teeth of the grey seal are pointed, sharp and short, suitable for catching and tearing open the conger eel, lumpsucker, pollack, and large ray and skate which I have seen it devour, generally by dog-like ripping and swallowing without mastication.

Breeding-habits are quite distinct. The young calves (or pups, as the seal-fishers call them) of the common seal are born either on a sandbank or skerry close to the water in June and July, and are able to swim immediately. They may even, like the young whale, dolphin and porpoise, be born in the sea. This has been witnessed recently off the Shetland coast. But the young grey seal is invariably born on land, on or above an open or cave beach, and the calf remains for two to four weeks ashore; if compelled to stay in the water for many hours during the first few days of its existence it will drown.

The young of almost every other species of seal pass through this period of dependence on the land or ice. But the sand or common seal is uniquely marine and precocious, being extremely well developed at birth to the extent of having, usually, shed its first white coat within the womb. This and its marine ways make it unprofitable for the seal-catcher to hunt. He must take his seals on land or ice: seals sink when shot. It is the young seal which is most easily taken, and those species are most valuable which wear a white natal coat.

Because of its marine habits, it is much more difficult to estimate populations of the common seal than of other seals; but herds of several hundred have been counted on the sandbanks of the Wash and other east coast lying-out grounds, and up to a hundred on skerries in Shetland.

By marking seals with numbered rings we may discover something more of their little-known migrations, numbers and longevity. The Norwegian government sent the naturalist Per Höst with the seal-fishers, and was in this way responsible for tracing some of the movements of the harp and hooded seals. The Fisheries Research Board of Canada is tail-marking numbers of seals. In the British Isles marking has lately been developed through the Zoological Society of London, which has supplied special self-clinching rings for clipping over the uppermost toe of the hind flipper. Several hundred grey seal calves and a few adults have now been ringed, with some interesting returns indicating a late autumnal dispersal of the young seals. Two from West Wales have reached Brittany, two were recovered in southern Ireland, and others nearer home on Welsh or Cornish coasts. Of calves ringed in the Farne Islands one has reached Norway a few days later and another the mouth of the Elbe in Germany.

As in most species of animals it is probably the young seal which is restless and wanders furthest: until it is old enough to breed it does not need to form a permanent attachment to any one herd. This is Nature's rule of dispersal and mingling in the tribe to ensure diffusion of blood. Yet it is also a good rule that most seals must eventually return to breed at or near their birthplace: in the main herd there are gaps to be filled as the old ones die; in a thriving species new colonies will be formed near the old and in that case it is the younger animals that are the new colonists.

There is some evidence that the grey seal forms more or less closed breeding-communities which are at least distinct by their different calving-periods. Thus in Wales and in the south-west calves appear from June to October. In Scotland the period is September-October. In the Farne Islands the majority of calves are born in November. In Canadian waters the calves appear on the ice early in the New Year; but in the Baltic not until February and March. How adaptable a young seal might be if it settled down in a colony with a different breeding-season from that of its native herd must be a matter of speculation. But seals are adaptable creatures.

This elasticity may have saved some seals from extermination; and may be the means to a rehabilitation of some of the rarest species.